50HX024-060
Single-Package Heat Pump Units

Installation, Start-Up and Service Instructions

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NOTE TO INSTALLER — READ THESE INSTRUCTIONS CAREFULLY AND COMPLETELY before installing this unit (Fig. 1). Also, make sure the Owner's Manual and Service Instructions are left with the unit after installation.

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

⚠ WARNING

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electric shock, or other occurrences which may injure you or damage your property. Consult a qualified installer or service agency for information or assistance. The qualified installer or agency must use only factory-authorized kits or accessories when modifying this product.

Understand the signal words — DANGER, WARNING, and CAUTION. Danger identifies the most serious hazards which will result in severe personal injury or death. Warning indicates a condition that could result in personal injury. Caution is used to identify unsafe practices which would result in minor personal injury or product and property damage.

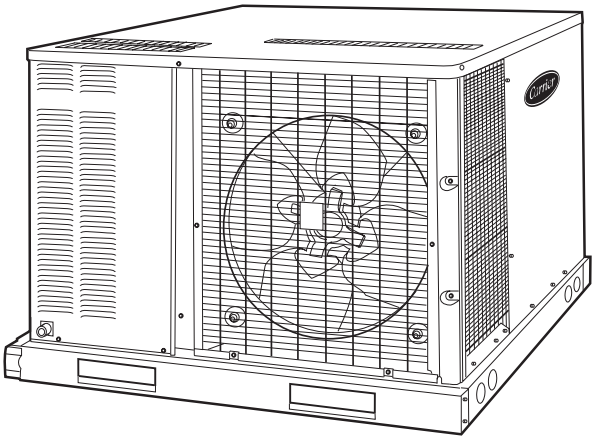


Fig. 1 — Model 50HX With Optional Base Rail Shown

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

1. The power supply (volts, phase, and hertz) must correspond to that specified on unit rating plate.
2. The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.
3. This installation must conform with local building codes and with NEC (National Electrical Code) or NFPA (National Fire Protection Association) 54 TIA latest revision. Refer to provincial and local plumbing or wastewater codes and other applicable local codes.
4. Approved for outdoor installation on wood flooring or on class A, B, or C roof covering materials.

⚠ WARNING

Before performing service or maintenance operations on system, turn off main power to unit. Turn off accessory heater power switch if applicable. Electrical shock can cause personal injury.

General — The 50HX heat pumps are fully self-contained and designed for outdoor installation. See Fig. 1. As shown in Fig. 2-5, standard units are shipped in a horizontal-discharge configuration for installation on a ground-level slab. Standard units can be converted to downflow (vertical) discharge configurations for rooftop applications. Optional downflow discharge units are also available. See Fig. 6 for roof curb dimensions.

RECEIVING AND INSTALLATION

Step 1 — Check Equipment

IDENTIFY UNIT — The unit model number and serial number are stamped on the unit identification plate. Check this information against shipping papers.

INSPECT SHIPMENT — Inspect for shipping damage while unit is still on shipping pallet. If unit appears to be damaged or is torn loose from its anchorage, have it examined by transportation inspectors before removal. Forward claim papers directly to transportation company. Manufacturer is not responsible for any damage incurred in transit.

Check all items against shipping list. Immediately notify the nearest Carrier Air Conditioning office if any item is missing.

To prevent loss or damage, leave all parts in original packages until installation.

Step 2 — Provide Unit Support

ROOF CURB — Install accessory roof curb in accordance with instructions shipped with curb. See Fig. 6. Install insulation, cant strips, roofing, and flashing. Ductwork must be attached to curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasketing material supplied with the roof curb. Improperly applied gasketing also can result in air leaks and poor unit performance.

Curb should be level to within ¼ inch (Fig. 7). This is necessary for unit drain to function properly. Refer to accessory roof curb installation instructions for additional information as required.

SLAB MOUNT — Place the unit on a solid, level concrete pad that is a minimum of 4 in. thick with 2 in. above grade (Fig. 8). The slab should extend approximately 2 in. beyond the casing on all 4 sides of the unit. Install a 6-in. gravel apron in front of outdoor coil air inlet to prevent obstruction of airflow by grass or shrubs. Do not secure the unit to the slab *except* when required by local codes. In areas where prolonged subfreezing temperatures or snowfall occur, increase clearance to 12 to 18 in. by constructing an angle-iron frame to support unit. See Fig. 9 for recommended frame construction. Alternate construction should follow dimensions provided in Fig. 9.

Step 3 — Provide Clearances — The required minimum service clearances and clearances to combustibles are shown in Fig. 2-5. Adequate ventilation and outdoor air must be provided.

The outdoor fan pushes air through the outdoor coil and discharges it through louvers on the top cover, the decorative grille, and the compressor access panel. Be sure that the fan discharge does not recirculate to the outdoor coil. Do not locate the unit in either a corner or under an overhead obstruction. The minimum clearance under a partial overhang (such as a normal house overhang) is 48 in. above the unit top. The maximum horizontal extension of a partial overhang must not exceed 48 inches. For extended overhangs, provide a minimum clearance of 36 inches.

⚠ CAUTION

Do not restrict outdoor airflow. An air restriction at either the outdoor-air inlet or the fan discharge can be detrimental to compressor life.

Do not place the unit where water, ice, or snow from an overhang or roof will damage or flood the unit. Do not install the unit on carpeting, tile, or other combustible materials.

Slab-mounted units should be at least 4 in. above the highest expected water and runoff levels. Do not use unit if it has been under water.

UNIT 50HX	ELECTRICAL CHARACTERISTICS	UNIT WT		CORNER WT Lb/Kg				UNIT HEIGHT	DIMENSION
		Lb	Kg	A	B	C	D	E	F
024	208-230-1-60	257	117	57/26	69/31	75/34	56/25	28.12/714.2	22.18/563.4
030	208-230-1-60, 208/230-3-60	288	131	56/25	87/40	74/34	71/32	28.12/714.2	22.18/563.4

UNIT 50HX	CENTER OF GRAVITY in./mm		
	X	Y	Z
024	20.43/519	21.27/540	11.25/286
030	20.38/518	21.54/547	11.25/286

Req'd Clearances for Servicing. in. (mm)

Indoor Coil Access Side 30 (762.0)
Control Box Access Side 30 (762.0)
(Except for NEC [National Electrical Code] Requirements)
Unit Top 36 (914.4)
Side Opposite Ducts 30 (762.0)

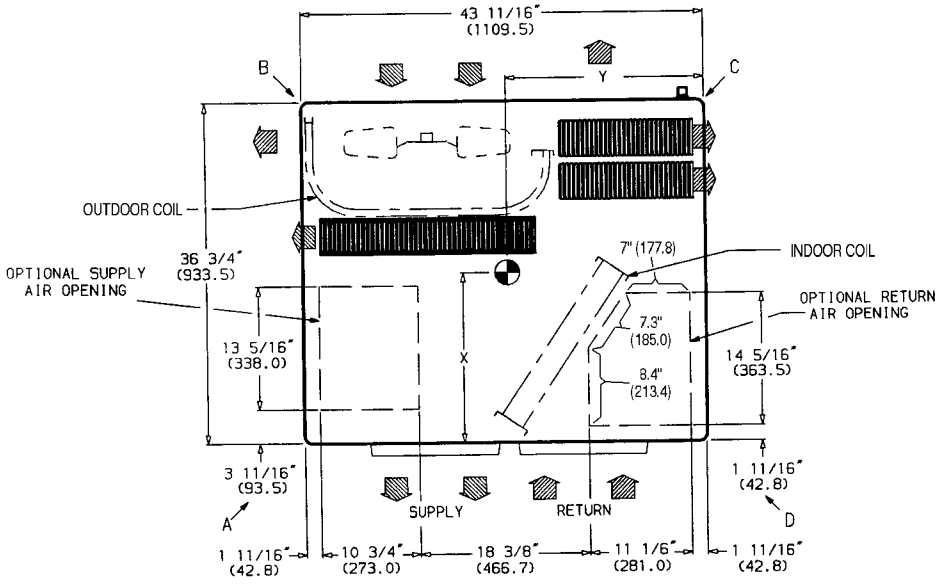
Req'd Clearances to Combustible Mat'l. in. (mm)

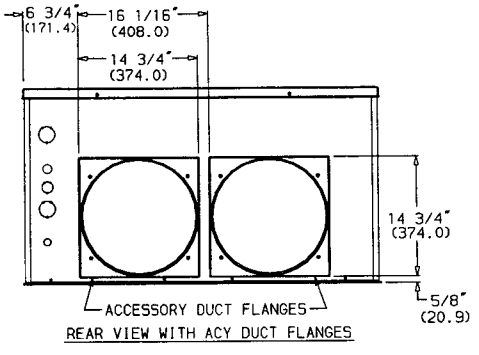
Unit Top 0
Duct Side of Unit 0
Side Opposite Ducts 0
Bottom of Unit 0
Vertical Discharge First 12 inches (304.8 mm) of Supply Duct 1 (25.4)

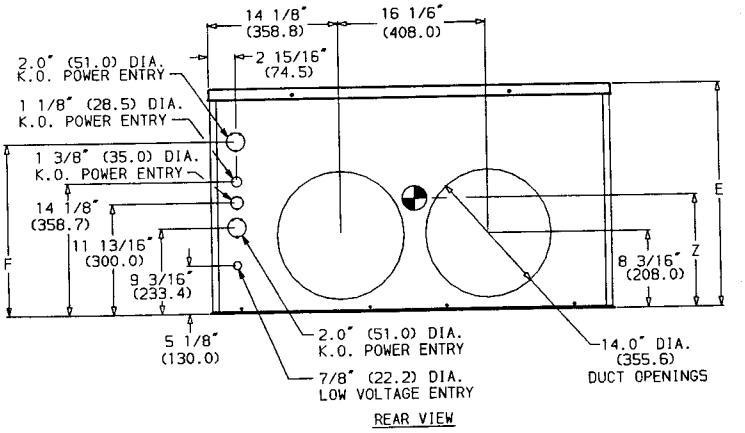
NEC Req'd Clearances. in. (mm)

Between Units, Control Box Side 42 (1066.8)
Unit and Ungrounded Surfaces, Control Box Side 36 (914.4)
Unit and Block or Concrete Walls And Other Grounded Surfaces, Control Box Side 42 (1066.8)

NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
2. ⊕ Indicates center of gravity.







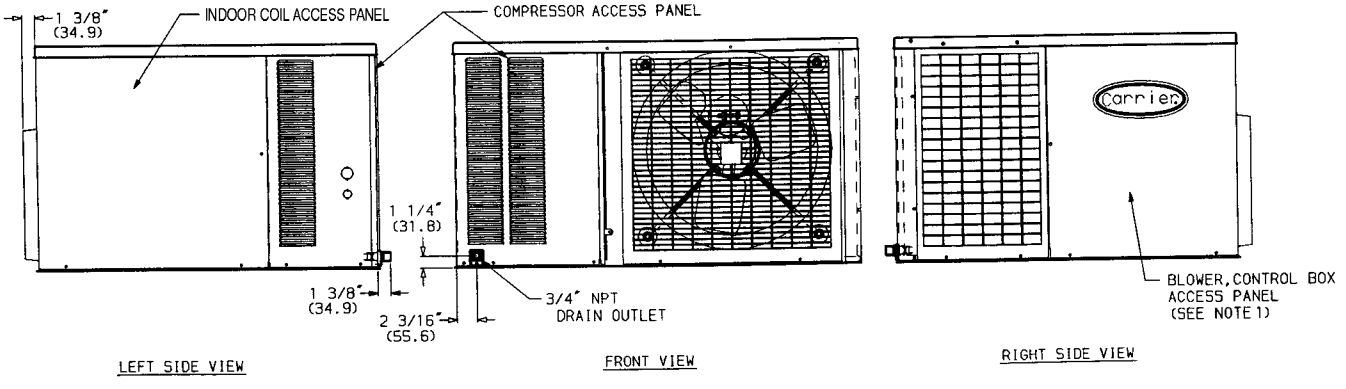
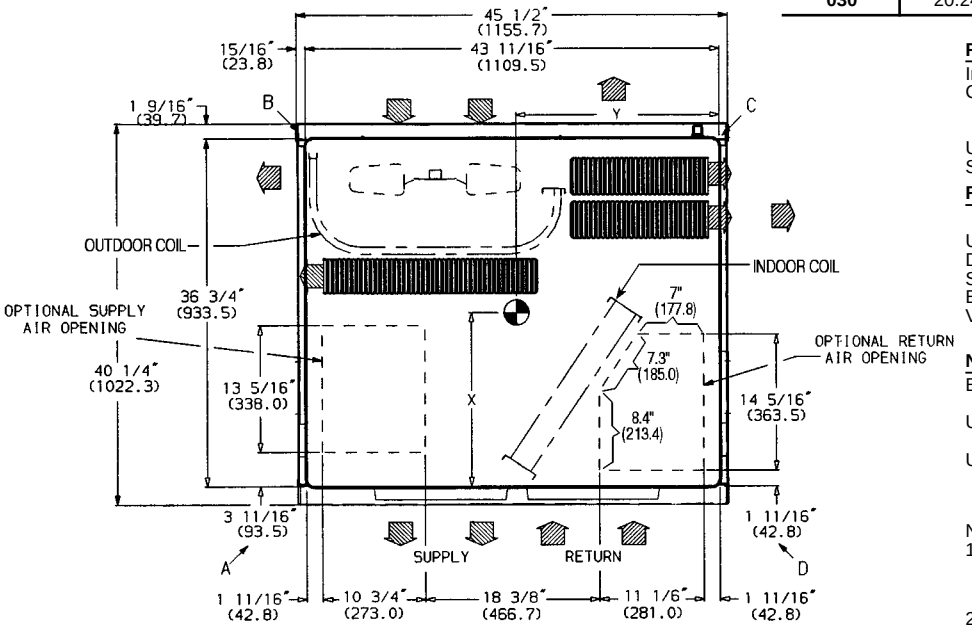


Fig. 2 — Dimensions; 50HX024,030 Without Base Rail

UNIT 50HX	ELECTRICAL CHARACTERISTICS	UNIT WT		CORNER WT Lb/Kg				UNIT HEIGHT	DIMENSION
		Lb	Kg	A	B	C	D	E	F
024	208-230-1-60	277	126	62/28	74/34	80/36	61/28	31.43/798.2	25.50/647.7
030	208-230-1-60, 208/230-3-60	308	140	61/28	92/42	79/36	76/35	31.43/798.2	25.50/647.7

UNIT 50HX	CENTER OF GRAVITY in./mm		
	X	Y	Z
024	20.27/515	21.30/541	13.83/351
030	20.24/514	21.55/547	13.83/351



Req'd Clearances for Servicing. in. (mm)

Indoor Coil Access Side 30 (762.0)
Control Box Access Side 30 (762.0)
(Except for NEC [National Electrical Code] Requirements)
Unit Top 36 (914.4)
Side Opposite Ducts 30 (762.0)

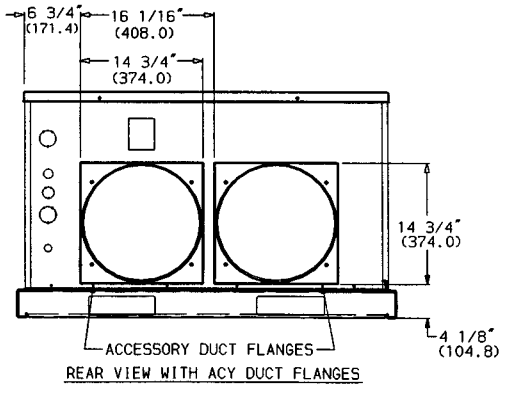
Req'd Clearances to Combustible Mat'l. in. (mm)

Unit Top 0
Duct Side of Unit 0
Side Opposite Ducts 0
Bottom of Unit 0
Vertical Discharge First 12 inches (304.8 mm) of Supply Duct 1 (25.4)

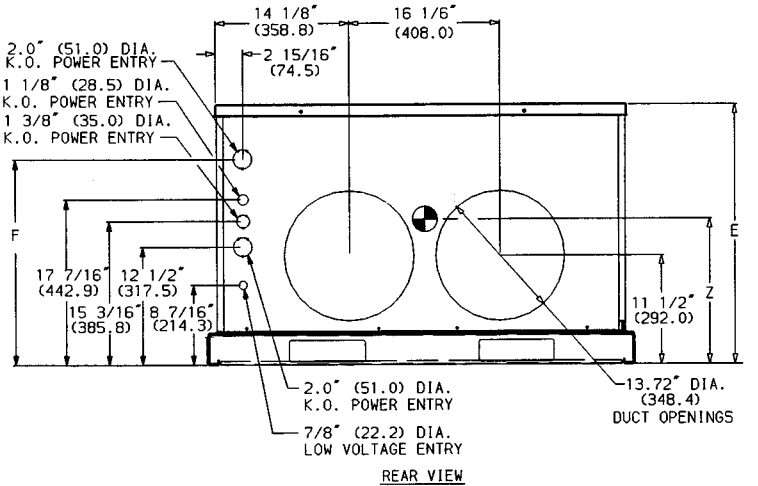
NEC Req'd Clearances. in. (mm)

Between Units, Control Box Side 42 (1066.8)
Unit and Ungrounded Surfaces, Control Box Side 36 (914.4)
Unit and Block or Concrete Walls And Other Grounded Surfaces, Control Box Side 42 (1066.8)

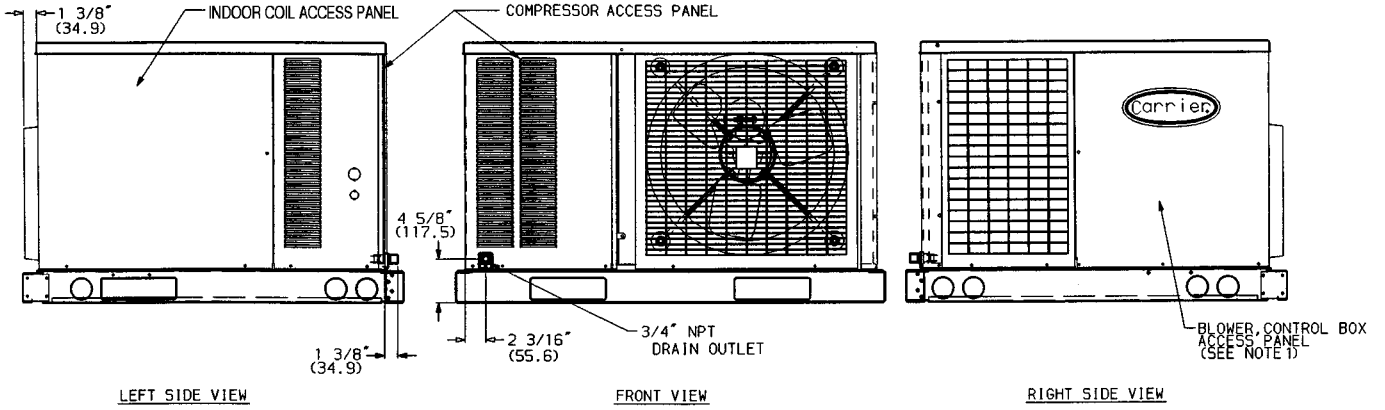
NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
2. ◒ Indicates center of gravity.



REAR VIEW WITH ACY DUCT FLANGES



REAR VIEW



LEFT SIDE VIEW | FRONT VIEW | RIGHT SIDE VIEW

Fig. 3 — Dimensions; 50HX024,030; With Optional Base Rail

UNIT 50HX	ELECTRICAL CHARACTERISTICS	UNIT WT		CORNER WT (Lb/Kg)			
		Lb	Kg	A	B	C	D
036	208-230-1-60, 208/230-3-60, 460-3-60	316	144	46/21	103/47	81/37	86/39
042	208-230-1-60, 208/230-3-60, 460-3-60	316	144	46/21	103/47	81/37	86/39
048	208-230-1-60, 208/230-3-60	359	163	89/40	81/37	113/51	76/35
060	208-230-1-60, 208/230-3-60	373	170	92/42	85/39	116/53	80/36

UNIT 50HX	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
036	21.23/539	20.46/520	13.65/347
042	21.23/539	20.46/520	13.65/347
048	19.70/500	20.54/522	15.00/381
060	19.65/499	20.59/523	15.00/381

NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
2. Indicates center of gravity.

Req'd Clearances for Servicing. in. (mm)

Indoor Coil Access Side 30 (762.0)
Control Box Access Side 30 (762.0)
(Except for NEC [National Electrical Code] Requirements)
Unit Top 36 (914.4)
Side Opposite Ducts 30 (762.0)

Req'd Clearances to Combustible Mat'l. in. (mm)

Unit Top 0
Duct Side of Unit 0
Side Opposite Ducts 0
Bottom of Unit 0
Vertical Discharge First 12 inches (304.8 mm) of Supply Duct 1 (25.4)

NEC Req'd Clearances. in. (mm)

Between Units, Control Box Side 42 (1066.8)
Unit and Ungrounded Surfaces, Control Box Side 36 (914.4)
Unit and Block or Concrete Walls And Other Grounded Surfaces, Control Box Side 42 (1066.8)

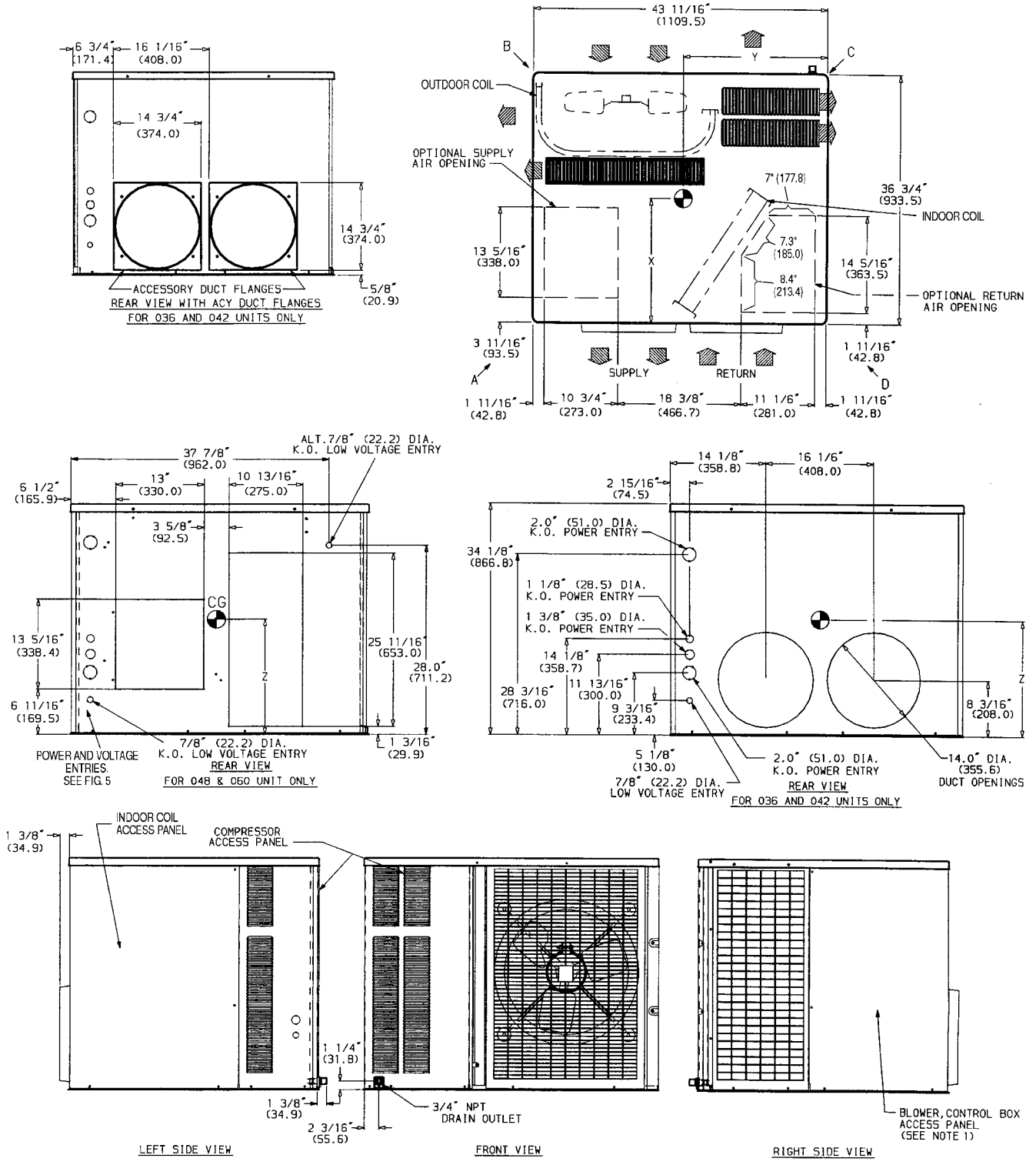


Fig. 4 — Dimensions; 50HX036-060; Without Base Rail

UNIT 50HX	ELECTRICAL CHARACTERISTICS	UNIT WT		CORNER WT (Lb/Kg)			
		Lb	Kg	A	B	C	D
036	208-230-1-60, 208/230-3-60, 460-3-60	336	153	51/23	108/49	86/39	91/41
042	208-230-1-60, 208/230-3-60, 460-3-60	336	153	51/23	108/49	86/39	91/41
048	208-230-1-60, 208/230-3-60	379	172	94/43	86/39	118/54	81/37
060	208-230-1-60, 208/230-3-60	393	179	97/44	90/41	121/55	85/39

UNIT 50HX	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
036	21.05/535	20.53/521	16.47/418
042	21.05/535	20.53/521	16.47/418
048	19.62/498.3	20.61/523.5	17.31/439.7
060	19.58/497.3	20.64/524.3	17.31/439.7

NOTES:
1. Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
2. ⊕ Indicates center of gravity.

Req'd Clearances for Servicing. in. (mm)

Indoor Coil Access Side 30 (762.0)
Control Box Access Side 30 (762.0)
(Except for NEC [National Electrical Code] Requirements)
Unit Top 36 (914.4)
Side Opposite Ducts 30 (762.0)

Req'd Clearances to Combustible Mat'l. in. (mm)

Unit Top 0
Duct Side of Unit 0
Side Opposite Ducts 0
Bottom of Unit 0
Vertical Discharge First 12 inches (304.8 mm) of Supply Duct 1 (25.4)

NEC Req'd Clearances. in. (mm)

Between Units, Control Box Side 42 (1066.8)
Unit and Ungrounded Surfaces, Control Box Side 36 (914.4)
Unit and Block or Concrete Walls And Other Grounded Surfaces, Control Box Side 42 (1066.8)

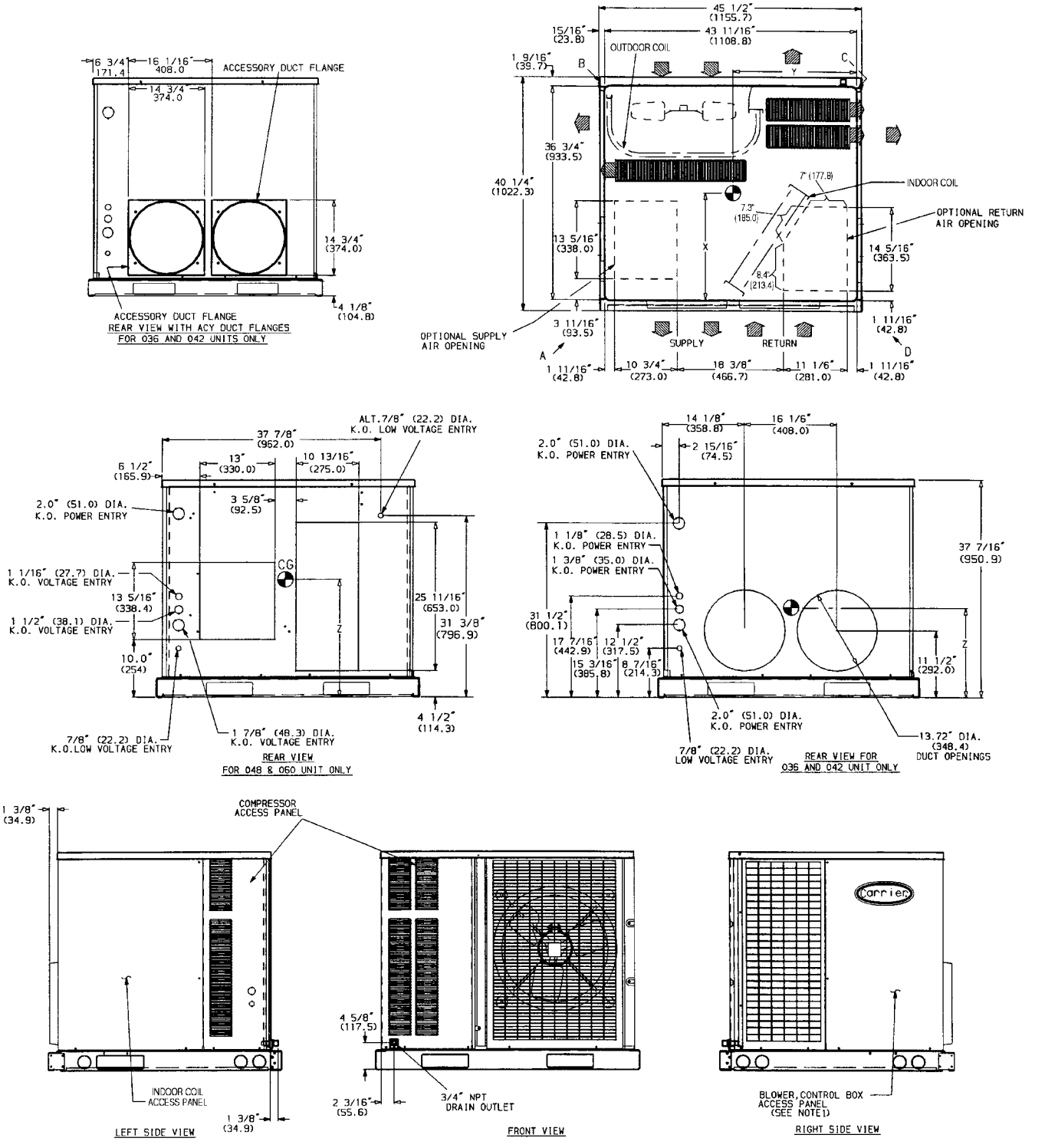
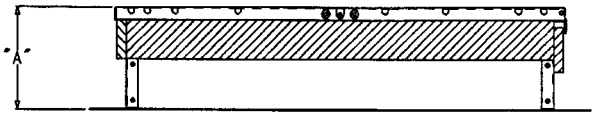

ACCESSORY DUCT FLANGE
ACCESSORY DUCT FLANGE
REAR VIEW WITH ACY DUCT FLANGES
FOR 036 AND 042 UNITS ONLY
OUTDOOR COIL
INDOOR COIL
OPTIONAL RETURN AIR OPENING
OPTIONAL SUPPLY AIR OPENING
SUPPLY
RETURN
ALT.7/8" (22.2) DIA. K.O. LOW VOLTAGE ENTRY
2.0" (51.0) DIA. K.O. POWER ENTRY
1 1/16" (27.7) DIA. K.O. VOLTAGE ENTRY
1 1/2" (38.1) DIA. K.O. VOLTAGE ENTRY
7/8" (22.2) DIA. K.O.LOW VOLTAGE ENTRY
1 7/8" (48.3) DIA. K.O. VOLTAGE ENTRY
REAR VIEW
FOR 048 & 060 UNIT ONLY
1 1/8" (28.5) DIA. K.O. POWER ENTRY
1 3/8" (35.0) DIA. K.O. POWER ENTRY
13.72" DIA. (348.4) DUCT OPENINGS
REAR VIEW FOR 036 AND 042 UNIT ONLY
COMPRESSOR ACCESS PANEL
INDOOR COIL ACCESS PANEL
3/4" NPT DRAIN OUTLET
BLOWER, CONTROL BOX ACCESS PANEL (SEE NOTE1)
LEFT SIDE VIEW
FRONT VIEW
RIGHT SIDE VIEW
Carrier

Fig. 5 — Dimensions; 50HX036-060 With Optional Base Rail

	PART NUMBER	"A"
FLAT	CPRFCURB001A00	8″ [203]
	CPRFCURB002A00	11″ [279]
	CPRFCURB003A00	14″ [356]



NOTES:
1. Roof curb must be set up for unit being installed.
2. Seal strip must be applied as required for unit being installed.
3. Dimensions in [ ] are in millimeters.
4. Roof curb is made of 16 gage steel.
5. Attach ductwork to curb (flanges of duct rest on curb).
6. Service clearance 4 ft on each side.
7. ⇨ Direction of airflow.
8. Insulated panels: 1-in. thick fiberglass, 1-lb density.

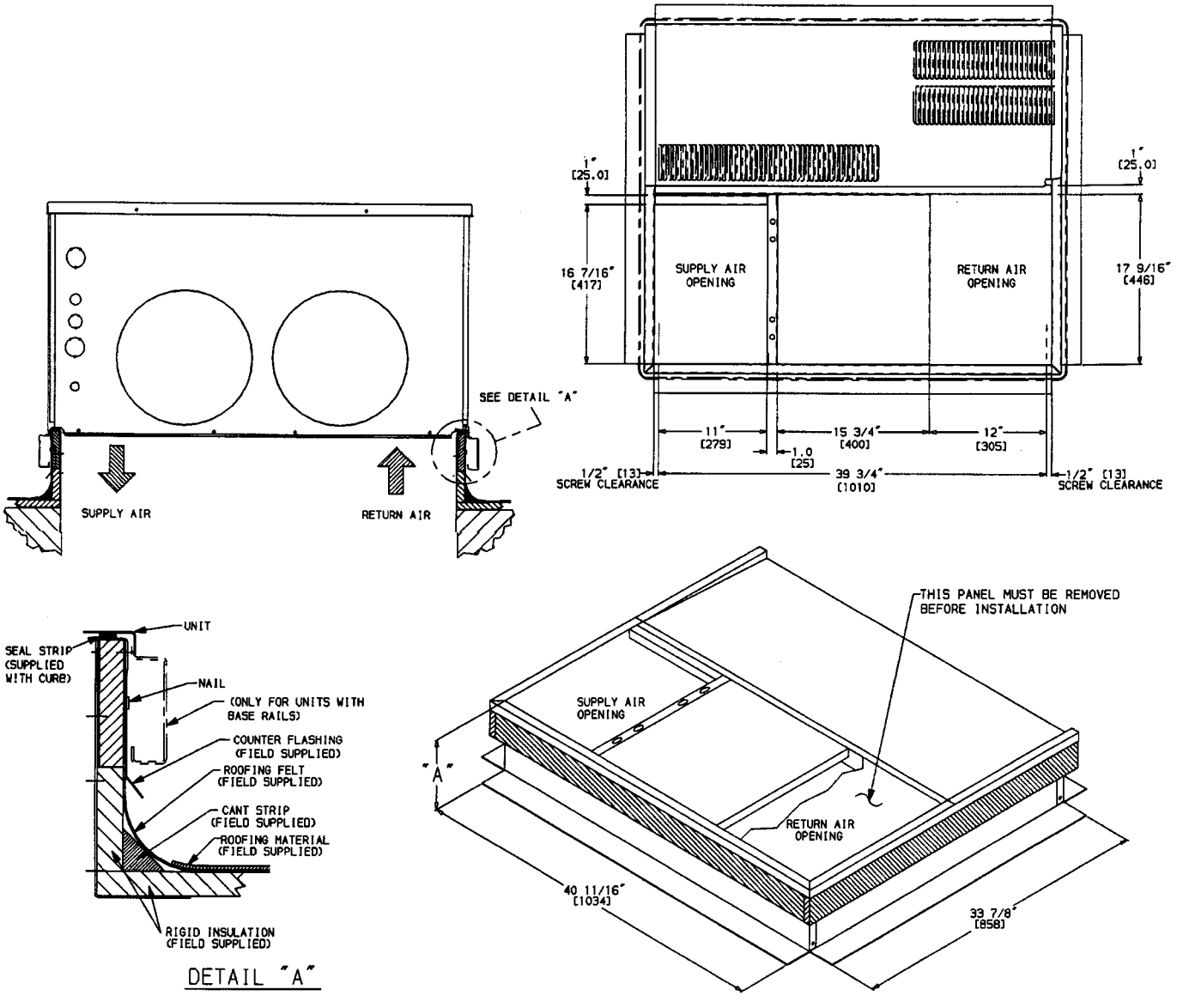
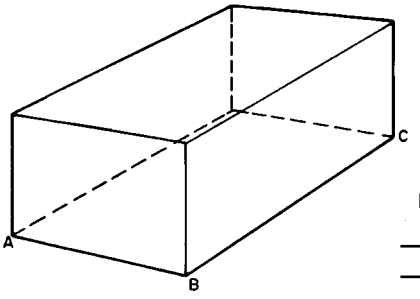


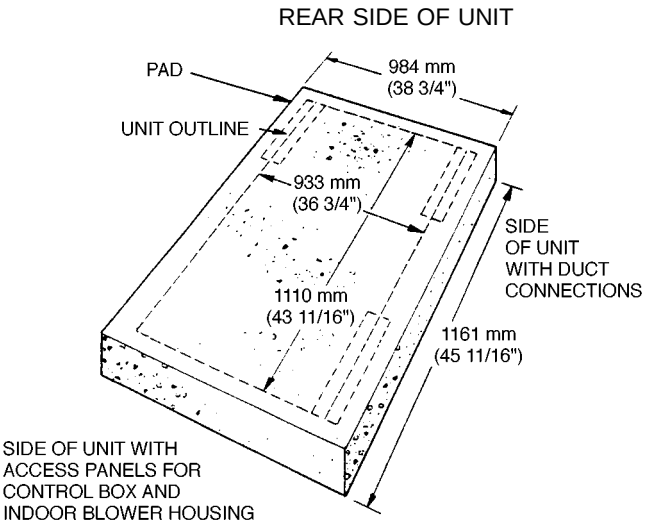
Fig. 6 — Roof Curb Dimensions



MAXIMUM ALLOWABLE DIFFERENCE (in.)

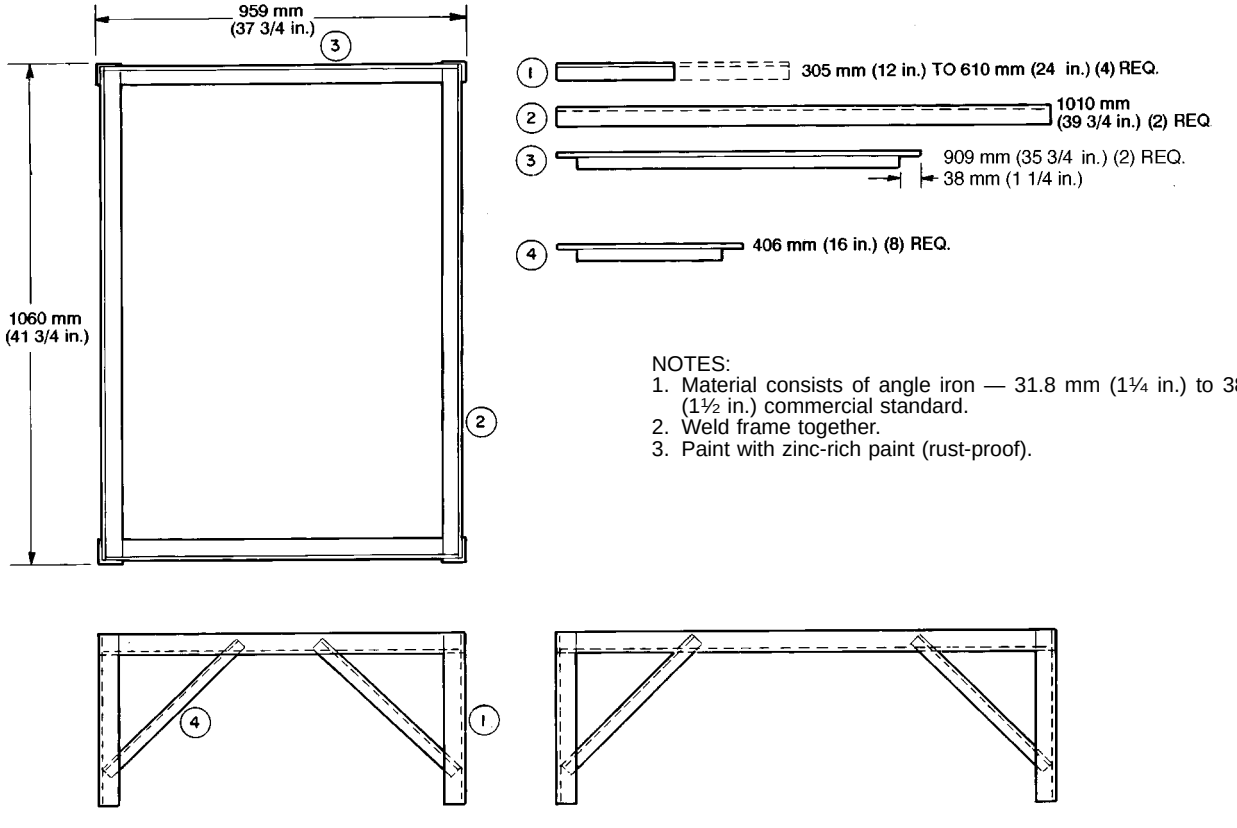
A-B	B-C	A-C
1/4	1/4	1/4

Fig. 7 — Unit Leveling Tolerances



NOTES:
1. Extend a 6-in. gravel apron around pad.
2. Provide a 3-ft service clearance at front and rear sides of unit.

Fig. 8 — Pad Dimensions



NOTES:
1. Material consists of angle iron — 31.8 mm (1¼ in.) to 38 mm (1½ in.) commercial standard.
2. Weld frame together.
3. Paint with zinc-rich paint (rust-proof).

Fig. 9 — Heat Pump Mounting Frame

Step 4 — Rig and Place Unit — Use spreader bars or crate top when rigging the unit. The units must be rigged for lifting as shown in Fig. 10. Refer to Fig. 10 and Table 1 for rigging weights and Fig. 2-5 for operating weights. *Use extreme caution to prevent damage when moving the unit. Unit must remain in an upright position during all rigging and moving operations.* The unit must be level for proper condensate drainage; the ground-level pad or accessory roof curb must be level before setting the unit in place. When a field-fabricated support is used, be sure that the support is level and that it properly supports the unit.

UNIT WITHOUT BASE RAILS — Accessory rigging brackets are recommended to be used for rigging. Install them as follows:

⚠ WARNING

Secure screws and paint protectors solidly against unit basepan to hold lifting brackets in position.
Never use lifting brackets when the temperature is below −10 F.

Never exceed 200 lbs per bracket of lifting force.

Never use lifting brackets for lifting other models of air conditioning units.

Lifting point should be directly over the unit center of gravity.

1. Position brackets as close to the corners of unit as possible. Be sure brackets are well outside of center of gravity. (See Fig. 2, 4, and 10.)
2. Position paint protectors and foam strips between screws and painted surface of unit. Tighten screws until they make contact with the paint protectors.
3. Secure device or hook of sufficient strength to hole in bracket as shown in detail ''C'' of Fig. 10.
4. If wood top is available, use it for a spreader bar to prevent straps from damaging unit. If wood top is not available, use spreader bars of sufficient length.

UNITS WITH OPTIONAL BASE RAILS — Keep unit upright and do not drop. Use spreader bars or top crate when rigging unit. Rollers may be used to move unit across roof. The unit must be level for proper condensate disposal. Rig unit as shown in Fig. 10. See Fig. 3 and 5 for additional information. Lifting holes are provided in base rails as shown in Fig. 10. Refer to rigging instructions on unit.

NOTICE TO RIGGERS

Hook rigging shackles through holes in lifting brackets as shown in Details ''A'' and ''C.'' Lifting brackets to be centered around the unit center of gravity. Use wood top skid when rigging, to prevent rigging straps from damaging unit. On units with rails, remove 4 screws to slide wood support through rectangular hole in rail.

⚠ CAUTION

All panels must be in place when rigging.

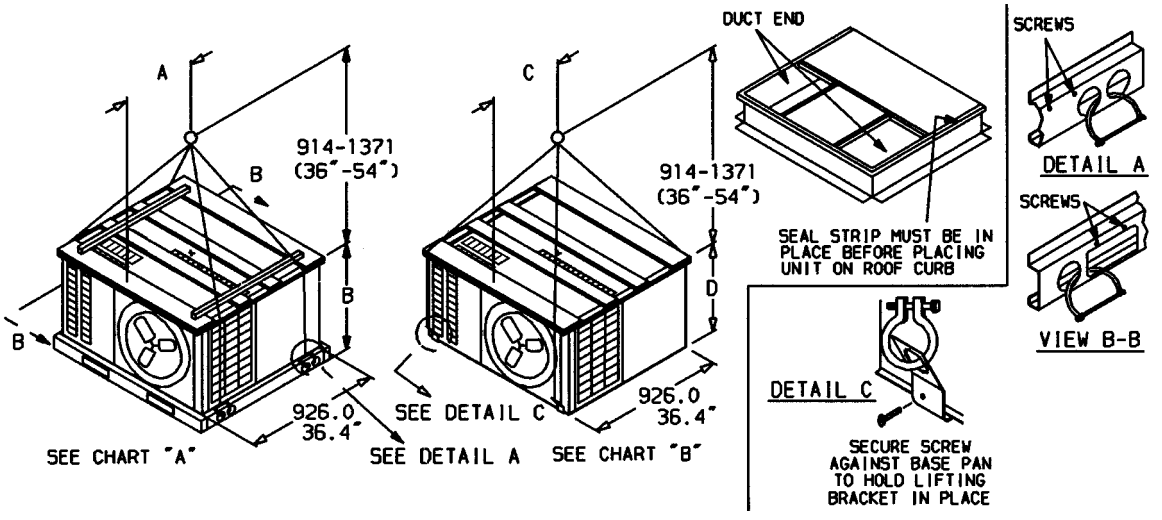


CHART "A" — UNITS WITH OPTIONAL BASE RAIL

UNIT SIZE 50HX	SHIPPING WEIGHT		A		B	
	Lb	Kg	in.	mm	in.	mm
024	296	134	16.1	410	32.2	817
030	327	148	16.2	411	32.2	817
036	355	161	15.4	390	38.2	969
042	355	161	15.4	390	38.2	969
048	398	180	16.9	428	38.2	969
060	412	187	16.9	429	38.2	969

CHART "B" — UNITS WITHOUT BASE RAIL

UNIT SIZE 50HX	SHIPPING WEIGHT		C		D	
	Lb	Kg	in.	mm	in.	mm
024	309	140	16.0	406	28.9	733
030	340	154	16.0	407	28.9	733
036	368	167	15.2	385	34.9	885
042	368	167	15.2	385	34.9	885
048	411	186	16.8	426	34.1	867
060	425	193	16.8	427	34.1	867

Fig. 10 — Suggested Rigging for Units With Optional Base Rail and Without Base Rail

Table 1 — Physical Data

UNIT 50HX	024	030	036	042	048	060
REFRIGERANT	R-22					
Refrigerant Control*	Acutrol™ System					
SHIPPING WEIGHT (lb)						
Without Base Rail	309	340	368	368	411	425
With Optional Base Rail	296	327	355	355	398	412
COMPRESSOR Type	Scroll					
INDOOR FAN	Centrifugal — Direct Drive					
Speeds	3	3	3	3	Variable	Variable
Rpm (High Speed)	1075	1075	1100	1100	—	—
Diameter	10	10	10	10	10	10
Width (in.)	9	9	9	9	10	10
Nominal Airflow (Cfm)	800	1000	1300	1400	1600	1800
Motor Hp	¼	¼	½	½	1.0	1.0
INDOOR COIL						
Rows...Fins/in.	3...15	3...15	3...15	4...15	4...15	4...15
Face Area (sq ft)	3.6	3.6	4.5	4.5	4.5	4.5
OUTDOOR FAN	Propeller — Direct Drive					
Cfm	2200	2200	2200	2400	2400	2400
Rpm	1100	1100	1100	1100	1100	1100
Diameter (in.)	20	20	20	20	20	20
Motor Hp	¼	¼	¼	¼	⅓	⅓
OUTDOOR COIL						
Rows...Fins/in.	2...17	2...17	2...17	2...17	2...17	2...17
Face Area (sq ft)	7.00	7.00	8.66	8.66	8.66	8.66
FILTER SIZE (in.)†						
Throwaway	24 x 24	24 x 24	24 x 30	24 x 30	24 x 30	24 x 30

*Operating charge listed on unit nameplate.
†Recommended field-supplied filters are 1-in. thick.

NOTE: Sizes 048 and 060 are equipped with an indoor integrated control motor (ICM).

Step 5 — Select and Install Ductwork — The design and installation of the duct system must be in accordance with the standards of the NFPA for installation of nonresidence-type air conditioning and ventilating systems, NFPA 90A or residence-type, NFPA 90B; and/or local codes and residence-type, NFPA 90B; and/or local codes and ordinances.

Select and size ductwork, supply-air registers, and return-air grilles according to ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) recommendations.

The unit has duct flanges on the supply- and return-air openings on the side of the unit. See Fig. 2-5 for connection sizes and locations.

When designing and installing ductwork, consider the following:

⚠ WARNING

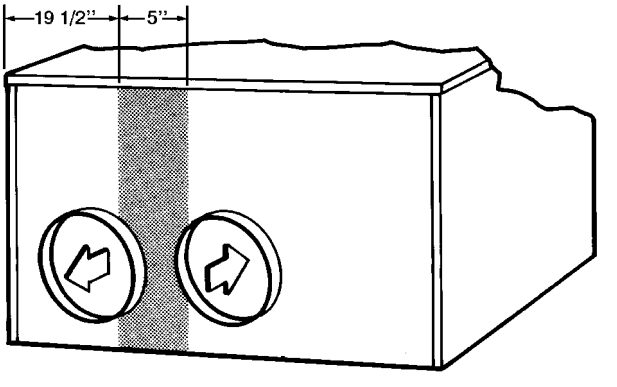
For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90 degree turn in the return ductwork between the unit and the conditioned space. If a 90 degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Due to electric heater, supply duct will require 90 degree elbow.

⚠ CAUTION

When connecting ductwork to units, do not drill deeper than ½ inch in shaded area shown in Fig. 11 or coil may be damaged.

- All units should have field-supplied filters or accessory filter rack installed in the return-air side of the unit. Recommended sizes for filters are shown in Table 1.
- Avoid abrupt duct size increases and reductions. Abrupt change in duct size adversely affects air performance.

IMPORTANT: Use flexible connectors between ductwork and unit to prevent transmission of vibration. Use suitable gaskets to ensure weathertight and airtight seal. When electric heat is installed, use fireproof canvas (or similar heat resistant material) connector between ductwork and unit discharge connection. If flexible duct is used, insert a sheet metal sleeve inside duct. Heat resistant duct connector (or sheet metal sleeve) must extend 24-in. from electric heater element.



NOTE: Shading indicates area not to be drilled deeper than ½ inch.

Fig. 11 — Area Not to Be Drilled

- Size ductwork for cooling air quantity (cfm). The minimum air quantity for proper electric heater operation is listed in Table 2. Heater limit switches may trip at air quantities below those recommended.

NOTE: A 90-degree elbow must be provided in the supply ductwork to comply with UL (Underwriters' Laboratories) codes for use with electric heat.

- Insulate and weatherproof all external ductwork. Insulate and cover with a vapor barrier all ductwork passing through conditioned spaces. Follow latest Sheet Metal and Air Conditioning Contractors National Association (SMACNA) and Air Conditioning Contractors Association (ACCA) minimum installation standards for residential heating and air conditioning systems.
- Secure all ducts to building structure. Flash, weatherproof, and vibration-isolate duct openings in wall or roof according to good construction practices.

Figure 12 shows a typical duct system with 50HX installed.

CONVERTING HORIZONTAL DISCHARGE UNITS TO DOWNFLOW (Vertical) DISCHARGE — NON-ICM (Integrated Control Motor) UNITS — For units shipped in a horizontal configuration, to convert to downflow (vertical) discharge, perform the following steps:

⚠ WARNING

Before performing service or maintenance operations on system, turn off main power to unit. Turn off accessory heater power switch if applicable. Electrical shock can cause personal injury.

1. Open all electrical disconnects before starting any service work.
2. Remove indoor coil access panel (Fig. 13). Save screws.
3. Locate lances in basepan insulation that are placed over the perimeter of the vertical duct opening cover (Fig. 14).
4. Using a straight edge and shop knife, cut and remove the insulation around the perimeter of the cover. Remove the screws securing the cover to the basepan and slide out the cover. Discard the cover (Fig. 15).
5. Remove indoor blower access panel (Fig. 16). Save screws.
6. Disconnect indoor-fan motor leads from indoor-fan relay and unit contactor. Carefully disengage wire tie containing indoor-fan motor leads from the unit control box (Fig. 17).
7. Remove screws (Fig. 18) securing indoor blower housing to blower shelf and carefully slide out blower housing. Remove filler bracket attached to the blower shelf and retain for later use.
8. Locate lances in basepan insulation that are placed over the perimeter of the vertical discharge opening cover (Fig. 19).
9. Using a straight edge and sharp knife, cut the insulation around the perimeter of the cover. Remove the screws securing the cover to the basepan and slide out the cover (Fig. 20). Discard the cover. Install filler bracket removed in Step 7.
10. If unit ductwork is to be attached to vertical opening flanges on the unit basepan (jackstand applications only), do so at this time.

Table 2 — Minimum Airflow for Safe Electric Heater Operation

UNIT SIZE 50HX					
024	030	036	042	048	060
700	875	1225	1225	1400	1750

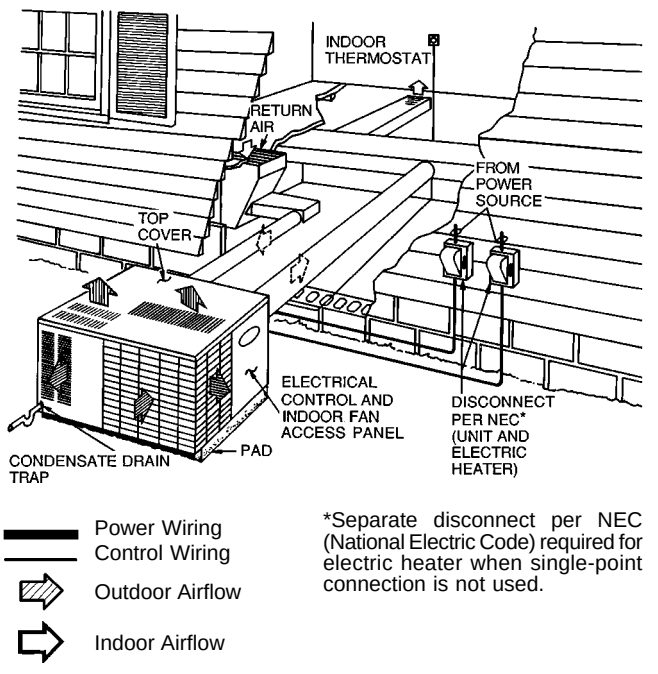

INDOOR THERMOSTAT
RETURN AIR
FROM POWER SOURCE
TOP COVER
ELECTRICAL CONTROL AND INDOOR FAN ACCESS PANEL
DISCONNECT PER NEC* (UNIT AND ELECTRIC HEATER)
PAD
CONDENSATE DRAIN TRAP
Power Wiring
Control Wiring
Outdoor Airflow
Indoor Airflow
*Separate disconnect per NEC (National Electric Code) required for electric heater when single-point connection is not used.

Fig. 12 — Typical Installation

11. It is recommended that the basepan insulation around the perimeter of the vertical opening be secured to the basepan with aluminum tape to prevent the insulation from tearing or bunching up when the blower housing is installed in the vertical discharge position.
12. Orient blower housing for vertical airflow (blower motor adjacent to horizontal duct opening) and slide into vertical opening making sure the flanges on the blower side plates engage the tabs in the unit basepan.

    Resistance will be felt as the blower housing contacts the basepan insulation; this can be overcome by applying a slight force to the base of the blower. Continue sliding blower in until hole in side plate flange aligns with the hole in the basepan.

    Secure using screws removed in Step 7. Reconnect indoor-fan motor leads and insert wire tie back into unit control box (Fig. 17).
13. Cover the horizontal duct openings. Duct covers can be ordered as an accessory or be field-fabricated as shown in Fig. 21.
14. Reinstall the indoor coil and indoor blower access panels.
15. After completing unit installation, perform all safety checks and power up unit.

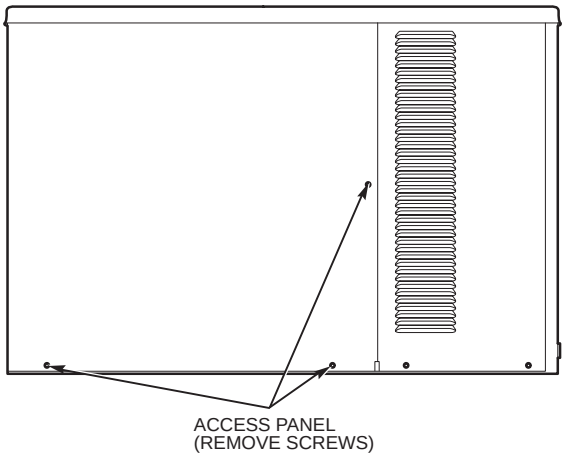


Fig. 13 — Indoor Coil Access Panel

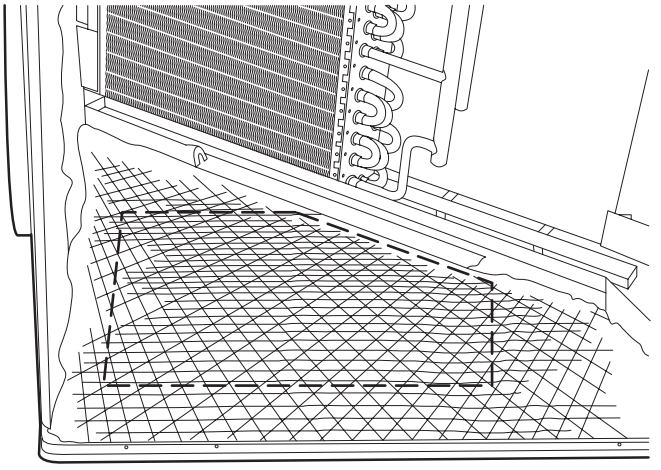


Fig. 14 — Basepan Insulation Over Vertical Duct Opening

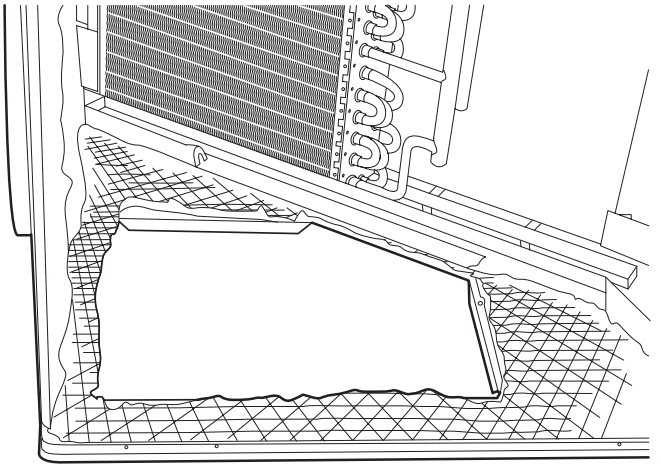


Fig. 15 — Insulation and Cover Removed from Vertical Duct Opening

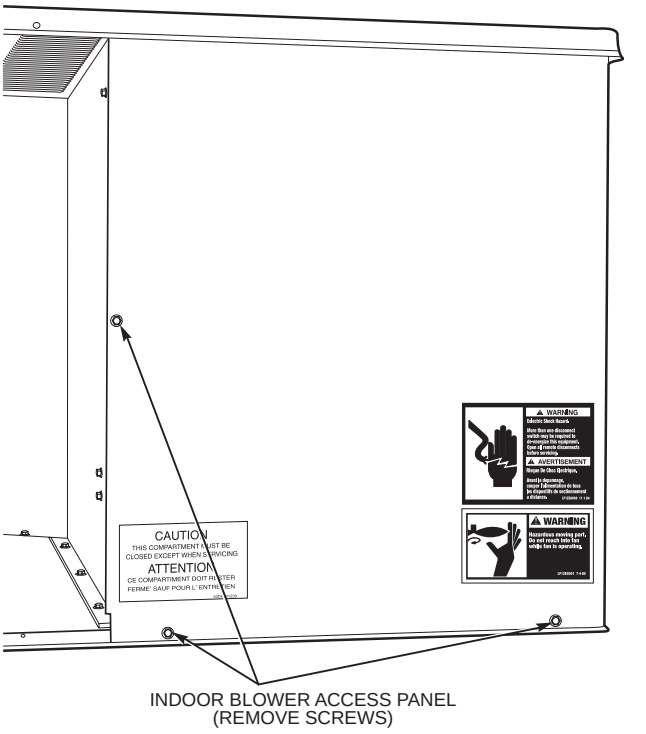


Fig. 16 — Indoor Blower Access Panel

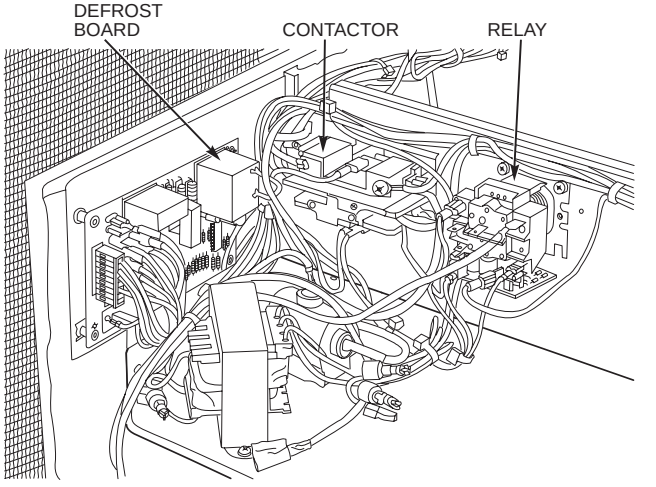


Fig. 17 — Fan Motor Leads

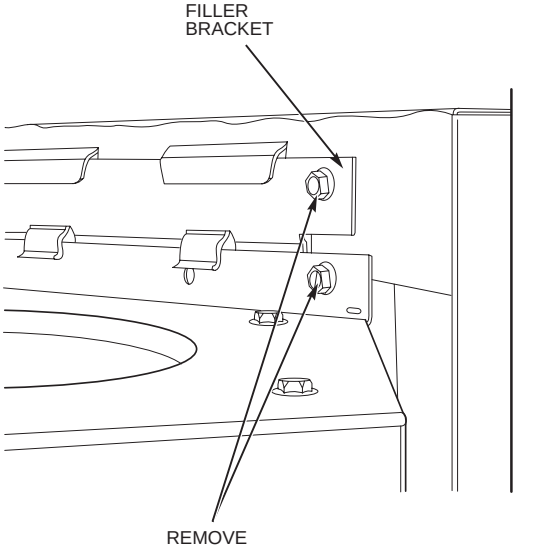


Fig. 18 — Blower Shelf and Housing

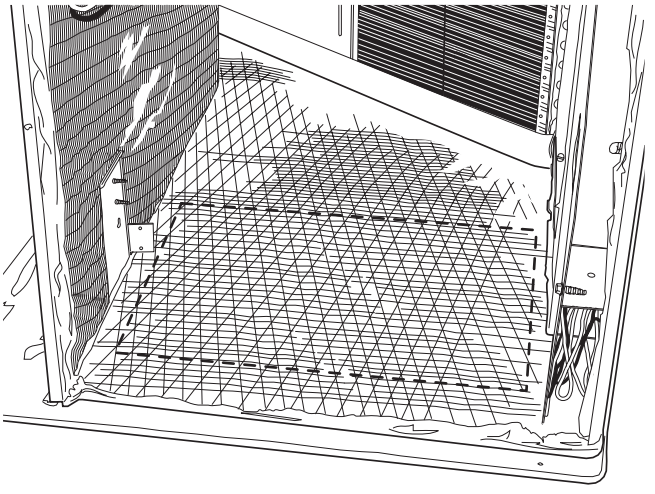


Fig. 19 — Basepan Insulation Over Vertical Discharge Opening

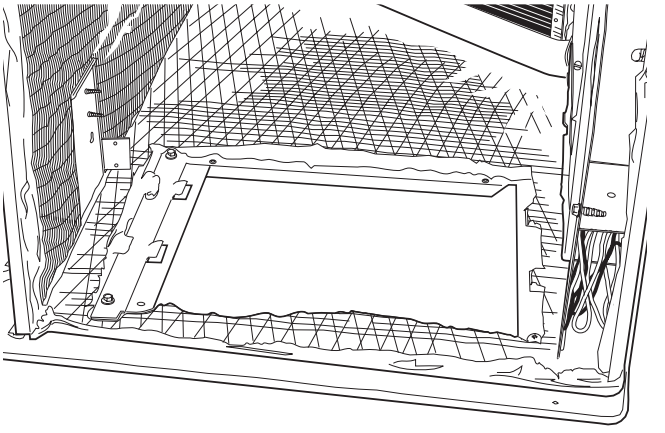
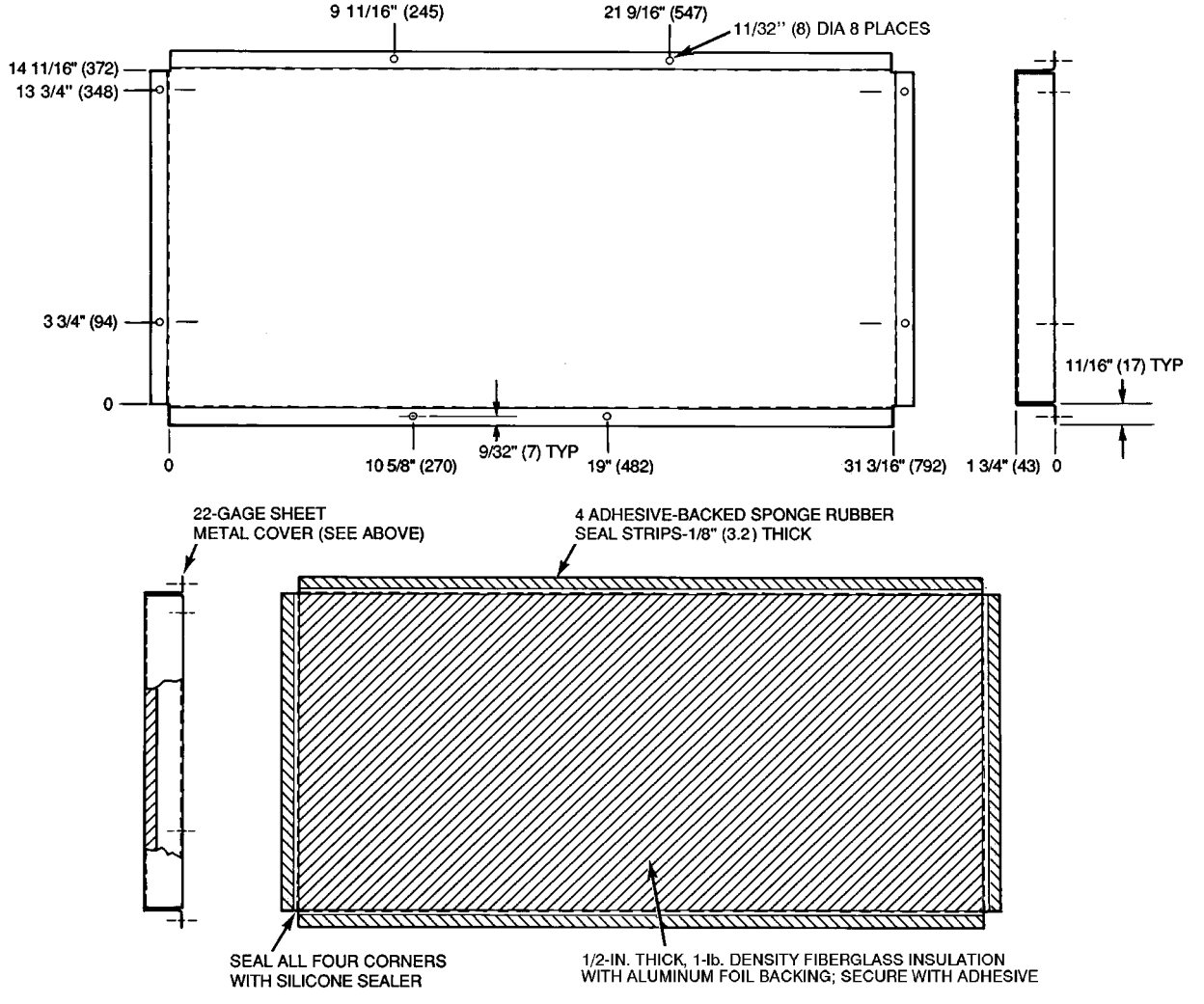


Fig. 20 — Insulation and Cover Removed from Vertical Discharge Opening



NOTES:
1. An accessory duct cover is available as an alternative to field fabrication.
2. Construct duct cover out of 22-gage sheet metal.
3. Dimensions in ( ) are in millimeters.

Fig. 21 — Field Fabricated Duct Cover

CONVERTING HORIZONTAL DISCHARGE UNITS TO DOWNFLOW (Vertical) DISCHARGE — ICM (Integrated Control Motor) UNITS — Units are shipped in a horizontal configuration. To convert a horizontal unit for downflow (vertical) discharge, perform the following steps:

⚠ WARNING

Before performing service or maintenance operations on system, turn off main power to unit. Turn off accessory heater power switch if applicable. Electrical shock can cause personal injury.

1. Open all electrical disconnects before starting any service work.
2. Remove indoor coil access panel (Fig. 13).
3. Locate lances in basepan insulation that are placed over the perimeter of the vertical duct opening cover (Fig. 14).
4. Using a straight edge and shop knife, cut and remove the insulation around the perimeter of the cover. Remove the screws securing the cover to the basepan and slide out the cover. Discard the cover (Fig. 15).
5. Remove indoor blower access panel (Fig. 16).
6. Remove screws (Fig. 18) securing indoor blower housing to blower shelf and carefully slide out blower housing. Disconnect the plug assemblies (Fig. 22) from the indoor-fan motor. There is a filler bracket attached to the blower shelf; remove this filler bracket and retain for later use. (See Fig. 22.)
7. Remove screws securing blower shelf to duct panel. Discard the blower shelf.
8. Locate lances in basepan insulation that are placed over the perimeter of the vertical discharge opening cover (Fig. 19).
9. Using a straight edge and sharp knife, cut the insulation around the perimeter of the cover. Remove the screws securing the cover to the basepan and slide out the cover (Fig. 20). Discard the cover. Install filler bracket removed in Step 6.
10. If unit ductwork is to be attached to vertical opening flanges on the unit basepan (jackstand applications only), do so at this time.
11. It is recommended that the basepan insulation around the perimeter of the vertical opening be secured to the basepan with aluminum tape to prevent the insulation from tearing or bunching up when the blower housing is installed in the vertical discharge position.
12. Remove screws securing the high-voltage raceway to duct panel. See Fig. 22. Temporarily place raceway on top of unit until blower housing is installed.
13. Orient blower housing for vertical airflow (blower motor adjacent to horizontal duct opening). See Fig. 23. Reconnect the plug assemblies. Slide blower housing into vertical opening making sure the flanges on the blower side plates engage the tabs in the unit basepan.

    Resistance will be felt as the blower housing contacts the basepan insulation; this can be overcome by applying a slight force to the base of the blower. Continue sliding blower in until hole in side plate flange aligns with the hole in the basepan. Secure using screws removed in Step 6.
14. Reinstall the high-voltage raceway removed in Step 12.
15. Cover the horizontal duct openings. Duct covers can be ordered as an accessory or be field-fabricated.
16. Reinstall the indoor coil and indoor blower access panels.
17. After completing unit installation, perform all safety checks and power up unit.

ACCESSORY DUCT FLANGE KIT INSTALLATION — Refer to Fig. 24 for duct adapter dimensions and hole locations. For unit 50HX060, refer to Fig. 5.

1. Mark hole locations shown in Fig. 24.
2. At marked locations, drill holes using a no. 26 (.147-in.) twist drill.
3. Partially secure duct flanges using two of the no. 10, ½-in. screws provided.
4. See the following caution. Using remaining holes in duct flanges as templates, drill the remaining holes with the no. 26 (.147-in.) drill.

⚠ CAUTION

Do not drill deeper than ½-in. into shaded area shown in Fig. 24. Damage to refrigerant coil could result.

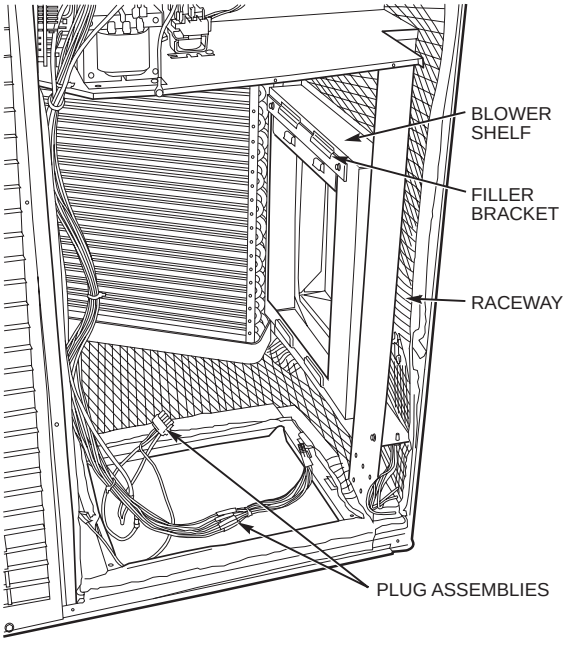


Fig. 22 — Filler Bracket and Blower Shelf

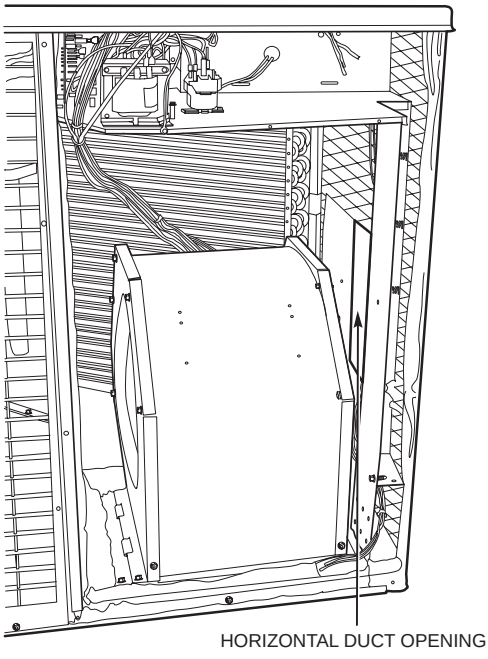
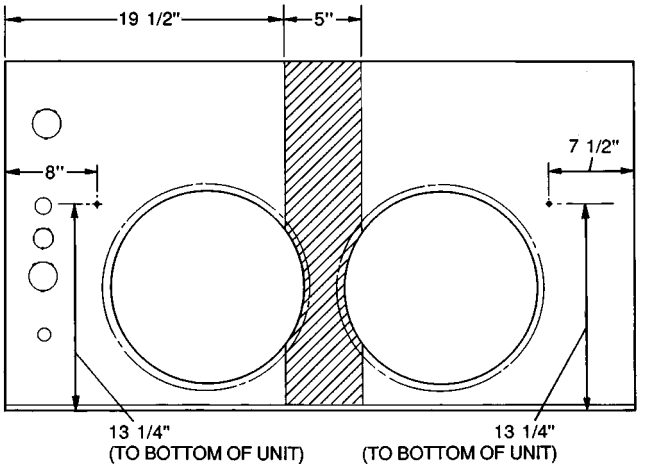


Fig. 23 — Housing Placed for Vertical Airflow

5. Fully secure the duct flanges using the remaining screws provided.

The finished kit installation accommodates a 14¾-in. x 14¾-in. duct.



NOTE: DO NOT DRILL MORE THAN ½-in. DEEP IN SHADED AREA.

Fig. 24 — Duct Flange Kit — Locating Holes

Step 6 — Provide for Condensate Disposal

NOTE: Ensure that condensate-water disposal methods comply with local codes, restrictions, and practices.

The 50HX units dispose of condensate through a ¾-in. NPT fitting which exits through the compressor access panel. See Fig. 2-5 for location of condensate connection.

Condensate water can be drained directly onto the roof in rooftop installations (where permitted) or onto a gravel apron in ground-level installations. Install a field-supplied condensate trap at end of condensate connection to ensure proper drainage. Make sure that the outlet of the trap is at least 1 in. lower than the drain-pan condensate connection to prevent the pan from overflowing. See Fig. 25. Prime the trap with water. When using a gravel apron, make sure it slopes away from the unit.

If the installation requires draining the condensate water away from the unit, install a field-supplied 2-in. trap at the condensate connection to ensure proper drainage. See Fig. 25. Condensate trap is available as an accessory or is field-supplied. Make sure that the outlet of the trap is at least 1 in. lower than the unit drain-pan condensate connection to prevent the pan from overflowing. Connect a drain tube using a minimum of field-supplied ¾-in. PVC or field-supplied ¾-in. copper pipe at outlet end of the 2-in. trap. *Do not undersize the tube.* Pitch the drain tube downward at a slope of at least 1 inch in every 10 ft of horizontal run. Be sure to check the drain tube for leaks. Prime the trap at the beginning of the cooling season start-up.

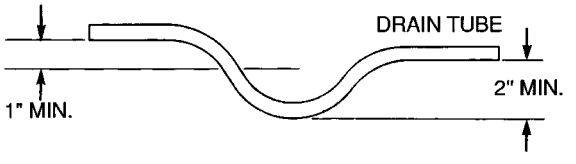


Fig. 25 — Drain Tubing Connections and Condensate Trap

Step 7 — Install Electrical Connections

⚠ WARNING

The unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of an electrical wire connected to the unit ground lug in the control compartment, or conduit approved for electrical ground when installed in accordance with NEC, ANSI/NFPA American National Standards Institute/National Fire Protection Association (latest edition) (in Canada, Canadian Electrical Code CSA C22.1) and local electrical codes. Failure to adhere to this warning could result in personal injury or death.

⚠ CAUTION

Failure to follow these precautions could result in damage to the unit being installed:

1. Make all electrical connections in accordance with NEC ANSI/NFPA (latest edition) and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA Standard C22.1 Canadian Electrical Code Part 1 and applicable local codes. Refer to unit wiring diagram.
2. Use only *copper* conductor for connections between field-supplied electrical disconnect switch and unit. DO NOT USE ALUMINUM WIRE.
3. Be sure that high-voltage power to unit is within operating voltage range indicated on unit rating plate. On 3-phase units, ensure that phases are balanced within 2%. Consult local power company for correction of improper voltage and/or phase imbalance.
4. Insulate low-voltage wires for highest voltage contained within conduit when low-voltage control wires are run in same conduit as high-voltage wires.
5. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc.

HIGH-VOLTAGE CONNECTIONS — The unit must have a separate electrical service with a field-supplied, waterproof disconnect switch mounted at, or within sight from the unit. Refer to the unit rating plate for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing. See Table 3 for electrical data.

The field-supplied disconnect may be mounted on the unit over the high-voltage inlet hole. See Fig. 2-5.

If the unit has an electric heater, a second disconnect may be required. Consult the Installation, Start-Up and Service Instructions provided with the accessory for electrical service connections.

⚠ CAUTION

Operation of unit on improper line voltage constitutes abuse and may cause unit damage that could affect warranty.

ROUTING POWER LEADS INTO UNIT — Use only copper wire between disconnect and unit. The high-voltage leads should be in a conduit until they enter the duct panel; conduit termination at the duct panel must be watertight. Run the high-voltage leads through the power entry knockout on the duct panel (see Fig. 26 for location and size). When the leads are inside the unit, run leads up the high-voltage raceway to the line wiring splice box (Fig. 27). For single-phase units, connect leads to the black and yellow wires; for 3-phase units, connect the leads to the black, yellow, and blue wires (see Fig. 28).

CONNECTING GROUND LEAD TO GROUND LUG — Refer to Fig. 27 and 28. Connect the ground lead to the chassis using the ground lug in the wiring splice box.

ROUTING CONTROL POWER WIRES — NON-ICM UNITS (24 v) — Form a drip-loop with the thermostat leads before routing them into the unit. Route the thermostat leads through grommeted, low-voltage hole provided in unit into unit control power splice box. See Fig. 26. Connect thermostat leads to unit control power leads as shown in Fig. 29.

The unit transformer supplies 24-v power for complete system including accessory electrical heater. An automatic-reset circuit breaker is provided in the 24-v circuit; see the caution label on the transformer or Fig. 30. Transformer is factory wired for 230-v operation. If supply voltage is 208 v, rewire transformer primary as described in Special Procedures for 208-V Operation section on page 19.

ROUTING CONTROL POWER WIRES — ICM UNITS (24 v) — Remove low-voltage knockout in the duct panel (see Fig. 26). Remove the rubber grommet from the installer's packet (included with unit) and install it in the knockout opening. Route thermostat wires through grommet providing a drip loop at the panel. Connect low-voltage leads to the thermostat as shown in Fig. 31.

Table 3 — Electrical Data

UNIT	NOMINAL V-Ph-Hz	COMPRESSOR		OFM	IFM	ELECTRIC HEAT			POWER SUPPLY MOCP	
		RLA	LRA	FLA	FLA	kW	FLA	Min Circuit Ampacity for Wire Sizing	MCA	Max
50HX024	208/230-1-60	11.2	56.0	1.4	2.0	3.75/ 5.00	18.1/20.8	42.1/ 45.6* 22.5/ 26.0†	17.4	25
						5.60/ 7.50	27.1/31.3	53.4/ 58.6* 33.7/ 39.1†		
						7.50/10.00	36.1/41.7	64.7/ 71.6* 45.1/ 50.8†		
50HX030	208/230-1-60	15.0	73.0	1.4	2.6	3.75/ 5.00	18.1/20.8	45.3/ 48.8* 22.5/ 26.0†	22.8	30
						5.60/ 7.50	27.1/31.3	56.6/ 61.8* 33.7/ 39.1†		
						7.50/10.00	36.1/41.7	67.9/ 74.8* 45.1/ 50.1†		
						11.30/15.00	54.1/62.0	90.4/100.3* 67.9/ 78.1†		
	208/230-3-60	10.1	63.0	1.4	2.8	7.50/10.00	20.8/24.1	42.7/ 46.7* 26.1/ 30.1†	16.6	25
						11.30/15.00	31.3/36.1	55.7/ 61.7* 39.1/ 45.2†		
50HX036	208/230-1-60	16.0	88.0	1.2	2.6	3.75/ 5.00	18.1/20.8	48.3/ 51.7* 22.5/ 26.0†	23.8	35
						5.60/ 7.50	27.1/31.3	56.6/ 61.8* 33.7/ 39.1†		
						7.50/10.00	36.1/41.7	67.9/ 74.8* 45.1/ 50.1†		
						11.30/15.00	54.1/62.0	90.4/100.3* 67.9/ 78.1†		
	208/230-3-60	10.3	77.0	1.2	2.6	7.50/10.00	20.8/24.1	44.5/ 48.5* 26.1/ 30.1†	16.7	25
						11.30/15.00	31.3/36.1	57.5/ 63.6* 39.1/ 45.2†		
						13.10/17.50	36.5/42.1	64.0/ 71.1* 45.6/ 51.3†		
	460-3-60	5.1	39.0	0.7	1.3	10.00	12.0* 12.2†	24.4* 15.3†	8.4	10
						15.00	18.0* 18.1†	31.9* 22.6†		
						17.50	21.0* 21.1†	35.6* 26.3†		
50HX042	208/230-1-60	20.0	104.0	1.4	3.1	3.75/ 5.00	18.1/20.8	52.1/ 55.5* 22.5/ 26.0†	29.5	45
						5.60/ 7.50	27.1/31.3	63.3/ 68.6* 33.7/ 39.1†		
						7.50/10.00	36.1/41.7	74.6/ 81.6* 45.1/ 50.8†		
						11.30/15.00	54.1/62.0	97.1/ 107.0* 67.9/ 78.1†		
						15.00/20.00	72.2/83.3	119.8/133.7* 90.1/104.2†		
	208/230-3-60	13.9	88.0	1.4	3.1	7.50/10.00	20.8/24.1	47.9/ 51.9* 26.1/ 30.1†	21.9	30
						11.30/15.00	31.3/36.1	61.0/ 67.0* 39.1/ 45.2†		
						13.10/17.50	36.5/42.0	67.5/ 74.5* 45.6/ 51.3†		

Table 3 — Electrical Data (cont)

UNIT	NOMINAL V-Ph-Hz	COMPRESSOR		OFM	IFM	ELECTRIC HEAT			POWER SUPPLY MOCP	
		RLA	LRA	FLA	FLA	kW	FLA	Min Circuit Ampacity for Wire Sizing	MCA	Max
50HX042 (cont)	460-3-60	6.8	44.0	0.8	1.6	10.00	12.0*	25.9*	10.9	15
							12.2†	15.3†		
						15.00	18.0*	33.5*		
							18.1†	22.6†		
						17.50	21.0*	37.2*		
							21.1†	26.3†		
50HX048	208/230-1-60	26.4	129.0	1.4	7.2	3.75/ 5.00	18.1/20.8	64.2/ 67.6*	41.6	60
								22.5/ 26.0†		
						5.60/ 7.50	27.1/31.3	75.4/ 80.7*		
								33.7/ 39.1†		
						7.50/10.00	36.1/41.7	86.7/ 93.7*		
								45.1/ 50.8†		
						11.30/15.00	54.1/62.0	109.2/ 119.1*		
								67.9/ 78.1†		
						15.00/20.00	72.2/83.3	131.9/145.8*		
								90.1/104.2†		
	208/230-3-60	15.0	99.0	1.4	7.2	7.50/10.00	20.8/24.1	53.4/ 57.4*	27.4	40
								24.1/ 26.1†		
						11.30/15.00	31.3/36.1	66.4/ 72.5*		
								39.1/ 45.2†		
						13.10/17.50	36.5/42.0	72.9/ 80.0*		
								45.6/ 51.3†		
50HX060	208/230-1-60	32.1	169.0	2.1	7.2	3.75/ 5.00	18.1/20.8	72.0/ 75.5*	48.7	80
								22.5/ 26.0†		
						5.60/ 7.50	27.1/31.3	83.3/ 88.5*		
								33.7/ 39.1†		
						7.50/10.00	36.1/41.7	94.6/ 101.5*		
								45.1/ 50.8†		
						11.30/15.00	54.1/62.0	117.1/126.9*		
								67.9/ 78.1†		
						15.00/20.00	72.2/83.3	139.6/153.5*		
								90.1/104.2†		
	208/230-3-60	19.3	123.0	2.1	7.2	7.50/10.00	20.8/24.1	59.5/ 63.5*	32.7	50
								26.1/ 30.1†		
						11.30/15.00	31.3/36.1	72.5/ 78.5*		
								39.1/ 45.2†		
						13.10/17.50	36.5/42.0	79.0/ 86.0*		
								45.6/ 51.3†		

LEGEND

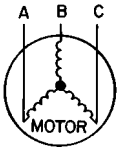
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor-Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection (fuses or HACR-type circuit breaker)
NEC — National Electrical Code
OFM — Outdoor-Fan Motor
RLA — Rated Load Amps
UL — Underwriters' Laboratories

*Single-Point Wiring Connections.
†Dual-Point Wiring Connections.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The UL, Canada, units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

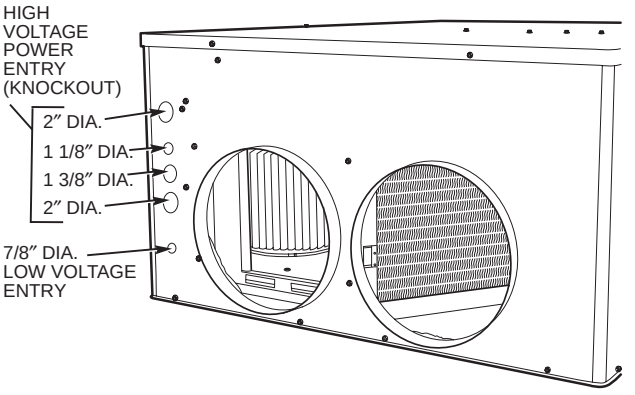
Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v
Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.



NOTE: Dimensions shown are for round-duct units. For rectangular-duct units, see Fig. 4 and 5.

Fig. 26 — Duct Panel Knockouts

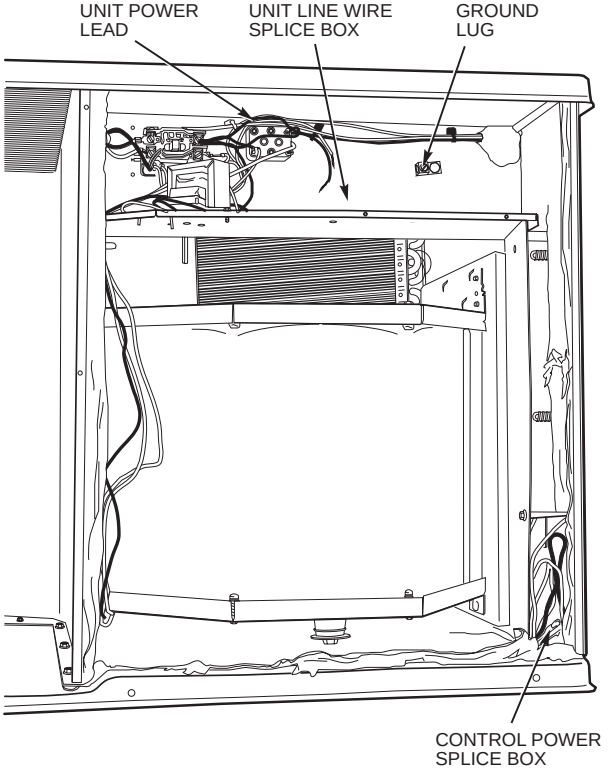


Fig. 27 — Wiring Splice Boxes

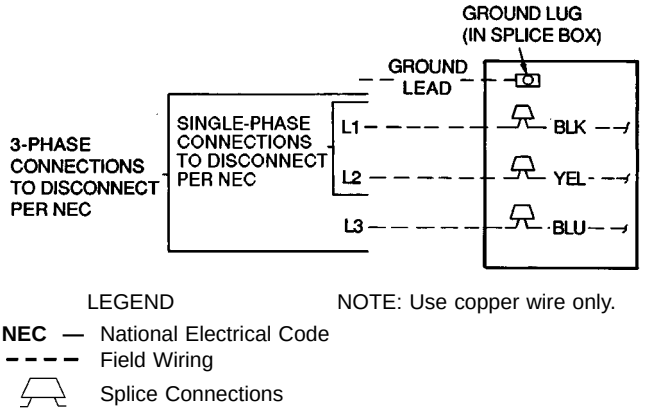


Fig. 28 — Line Power Connections

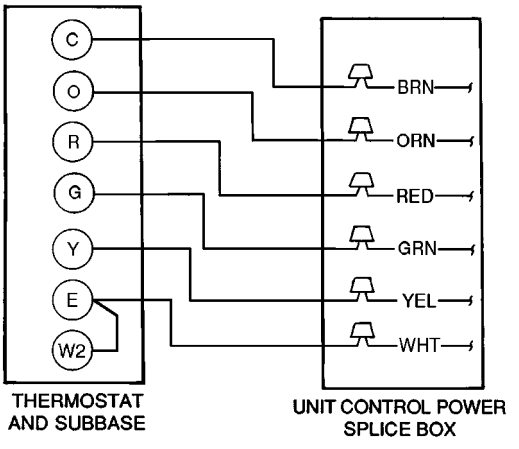


Fig. 29 — Control Connections

⚠ CAUTION

TRANSFORMER CONTAINS AUTO RESET OVERCURRENT PROTECTOR.

IT MAY RESET WITHOUT WARNING STARTING HEATING OR COOLING SECTION OF THIS PRODUCT.

DISCONNECT POWER PRIOR TO SERVICING.

THIS COMPARTMENT MUST BE CLOSED EXCEPT WHEN SERVICING.

316056-201 REV A

Fig. 30 — Transformer Label

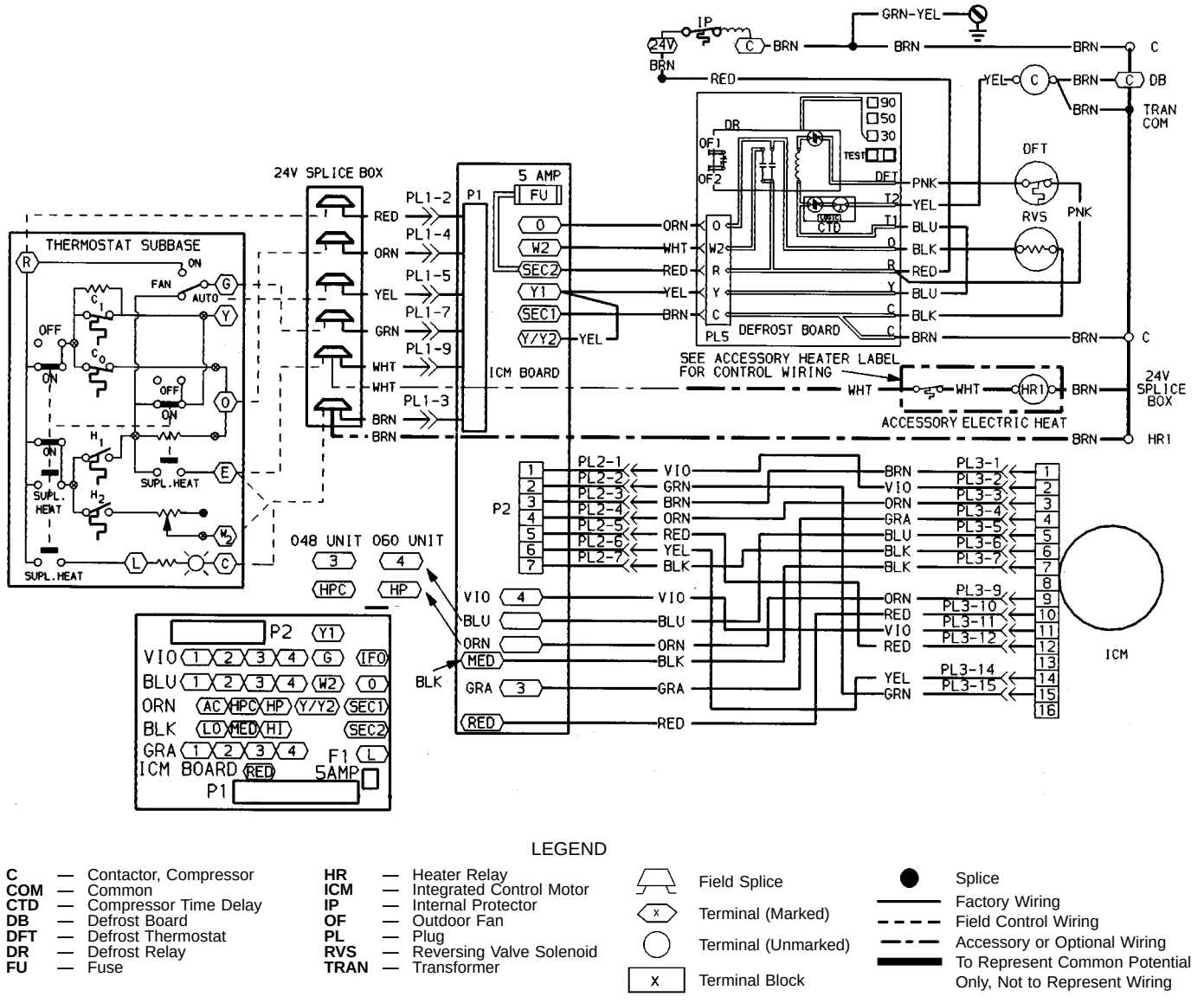


Fig. 31 — 208/230-V Integrated Control Motor Wiring Schematic

SPECIAL PROCEDURES FOR 208-V OPERATION

⚠ WARNING

Make sure that the power supply to the unit is switched OFF before making any wiring changes. Electrical shock can cause personal injury or death.

1. Disconnect the orange transformer-primary lead from the contactor. See unit wiring label.
2. Remove the wirenut from the terminal on the end of the red transformer-primary lead.
3. Save the wirenut.
4. Connect the red lead to the contactor terminal from which the orange lead was disconnected.
5. Using the wirenut removed from the red lead, insulate the loose terminal on the orange lead.
6. Wrap the wirenut with electrical tape so that the metal terminal cannot be seen.

Indoor blower-motor speeds may need to be changed for 208-v operation. Refer to Indoor Airflow and Airflow Adjustments section on page 24.

PRE-START-UP

⚠ WARNING

Failure to observe the following warnings could result in serious personal injury:

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected.
4. Relieve all pressure from both high- and low-pressure sides of the system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals. Use accepted methods to recover refrigerant.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
   a. Shut off electrical power to unit.
   b. Relieve all pressure from system using both high- and low-pressure ports. Use accepted methods to recover refrigerant.
   c. Cut component connecting tubing with tubing cutter and remove component from unit.
   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Use the Start-Up Checklist supplied at the end of this book and proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, or liquid-soap solution. If a refrigerant leak is detected, see following Check for Refrigerant Leaks section.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that outdoor-fan blade is correctly positioned in fan orifice. Leading edge of blade should be 2 in. back from condenser inlet grille or ½ in. maximum from fan deck.
   b. Make sure that air filter(s) is in place.
   c. Make sure that condensate drain pan and trap are filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.
5. Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.
6. Each unit system has 2 Schrader-type ports, one low-side Schrader fitting located on the suction line, and one high-side Schrader fitting located on the compressor discharge line. Be sure that caps on the ports are tight.

START-UP

Use the Start-Up Checklist supplied at the end of this book, and proceed as follows:

Check for Refrigerant Leaks — Locate and repair refrigerant leaks and charge the unit as follows:

1. Using both high- and low-pressure ports, locate leaks and reclaim remaining refrigerant to relieve system pressure.
2. Repair leak following accepted practices.

   NOTE: Install a filter drier whenever the system has been opened for repair.
3. Check system for leaks using an approved method.
4. Evacuate refrigerant system and reclaim refrigerant if no additional leaks are found.
5. Charge unit with R-22 refrigerant, using a volumetric-charging cylinder or accurate scale. *Refer to unit rating plate for required charge.* Be sure to add extra refrigerant to compensate for internal volume of filter drier.

Unit Start-Up Adjustments

⚠ CAUTION

Complete the required procedures given in the Pre-Start-Up section on this page before starting the unit.

Do not jumper any safety devices when operating the unit.

Do not operate the unit in Cooling mode when the outdoor temperature is below 40 F (unless accessory low-ambient kit is installed).

Do not rapid-cycle the compressor. Allow 5 minutes between ''on'' cycles to prevent compressor damage.

CHECKING COOLING AND HEATING CONTROL OPERATION — Start and check the unit for proper control operation as follows:

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down within 30 seconds when FAN switch is placed in AUTO. position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO. position. Set control below room temperature. Observe that compressor, outdoor fan, and indoor blower motors start. Observe that cooling cycle shuts down when control setting is satisfied.
3. Place system switch in HEAT position. Set control above room temperature. Observe that heating cycle shuts down when control setting is satisfied.
4. When using an automatic changeover room thermostat, place both SYSTEM and FAN switches in AUTO. positions. Observe that unit operates in Cooling mode when temperature control is set to ''call for Cooling'' (below room temperature), and unit operates in Heating mode when temperature control is set to ''call for heating'' (above room temperature).

IMPORTANT: Three-phase, scroll compressors are direction-oriented. Unit sizes 030-060 must be checked to ensure proper compressor 3-phase power lead orientation. If not corrected within 5 minutes, the internal protector will shut off the compressor. The 3-phase power leads to the unit must be reversed to correct rotation. When turning backwards, scroll compressors emit elevated noise levels, and the difference between compressor suction and discharge pressures may be dramatically lower than normal.

CHECKING AND ADJUSTING REFRIGERANT CHARGE — The refrigerant system is fully charged with R-22 refrigerant, and is tested and factory sealed.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-22 charge. The charging label and the tables shown refer to system temperatures and pressures in Cooling mode only. If charge level is suspect in Heating mode, reclaim all refrigerant and charge to nameplate amount.

A superheat charging label is attached to the inside of the compressor access door. The label includes a ''Superheat Charging Table'' and a ''Required Suction-Tube Temperature (F)'' chart.

An accurate superheat, thermocouple-, or thermistor-type thermometer, a sling psychrometer, and a gage manifold are required when using the superheat charging method for evaluating the unit charge. *Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.*

⚠ CAUTION

When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system, such as insufficient airflow across either coil or both coils.

Proceed as follows:

1. Remove caps from low- and high-pressure service fittings.
2. Using hoses with valve core depressors, attach low- and high-pressure gage hoses to low- and high-pressure service fittings, respectively.
3. Start unit in Cooling mode and let unit run until system pressures stabilize.
4. Measure and record the following:
   a. Outdoor ambient-air temperature (F db).
   b. Indoor inlet-air temperature (F wb).
   c. Suction-tube temperature (F) at low-side service fitting.
   d. Suction (low-side) pressure (psig).
5. Using Superheat Charging Tables 4A-4F, compare outdoor-air temperature (F db) with indoor inlet-air temperature (F wb) to determine desired system operating superheat temperature.
6. Using Required Suction-Tube Temperature (F) Table 5, compare desired superheat temperature with suction (low-side) operating pressure (psig) to determine proper suction-tube temperature.
7. Compare actual suction-tube temperature with proper suction-tube temperature. Using a tolerance of ±3° F, add refrigerant if actual temperature is more than 3° F higher than proper suction-tube temperature, or remove refrigerant if actual temperature is more than 3° F lower than required suction-tube temperature.

NOTE: If the problem causing the inaccurate readings is a refrigerant leak, refer to Check for Refrigerant Leaks section on page 20.

Table 4A — Superheat Charging Table, 50HX024

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 800 CFM Indoor Air — Ewb (F)										
		56	58	60	62	64	66	68	70	72	74	76
65	SPH	*	*	24.0	27.4	30.8	31.1	31.5	30.5	29.5	29.2	28.9
70	SPH	*	*	19.5	24.4	29.3	29.9	30.4	29.5	28.6	28.2	27.8
75	SPH	*	*	15.0	21.4	27.8	28.6	29.4	28.5	27.7	27.2	26.7
80	SPH	*	*	7.5	14.4	21.4	24.5	27.6	27.1	26.5	26.1	25.6
85	SPH	*	*	*	7.5	15.0	20.4	25.8	25.6	25.4	24.9	24.5
90	SPH	*	*	*	*	7.5	14.0	20.4	22.3	24.2	23.8	23.4
95	SPH	*	*	*	*	*	7.5	15.0	19.0	23.1	22.7	22.3
100	SPH	*	*	*	*	*	*	7.5	13.5	19.5	20.3	21.1
105	SPH	*	*	*	*	*	*	*	8.0	16.0	18.0	20.0
110	SPH	*	*	*	*	*	*	*	*	12.4	15.7	18.9
115	SPH	*	*	*	*	*	*	*	*	8.9	13.3	17.8

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)
*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 4B — Superheat Charging Table, 50HX030

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 1000 CFM											
		Indoor Air — Ewb (F)											
		54	56	58	60	62	64	66	68	70	72	74	76
65	SPH	5.5	5.5	5.5	5.5	12.5	19.6	26.6	26.9	27.2	27.5	26.5	25.4
70	SPH	*	*	*	*	10.5	17.5	24.5	24.8	25.1	25.4	25.1	24.8
75	SPH	*	*	*	*	8.4	15.5	22.5	22.8	23.1	23.4	23.8	24.2
80	SPH	*	*	*	*	6.8	12.9	18.9	20.3	21.5	22.9	23.0	23.0
85	SPH	*	*	*	*	5.1	10.2	15.4	17.7	20.1	22.3	22.1	21.8
90	SPH	*	*	*	*	*	7.9	11.9	15.2	18.5	21.8	21.5	21.2
95	SPH	*	*	*	*	*	5.6	8.4	12.7	17.0	21.2	20.8	20.6
100	SPH	*	*	*	*	*	*	*	9.2	14.1	19.1	19.5	19.9
105	SPH	*	*	*	*	*	*	*	5.7	11.4	17.1	18.2	19.3
110	SPH	*	*	*	*	*	*	*	5.0	10.0	15.1	16.9	18.6
115	SPH	*	*	*	*	*	*	*	*	8.7	13.0	15.5	18.0

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)
*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 4C — Superheat Charging Table, 50HX036

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 1150 CFM											
		Indoor Air — Ewb (F)											
		54	56	58	60	62	64	66	68	70	72	74	76
65	SPH	28.6	28.6	28.6	30.4	32.1	33.3	34.3	33.4	32.0	30.7	29.8	28.9
70	SPH	23.8	23.8	23.8	25.5	27.2	29.5	32.3	32.0	30.9	29.7	28.6	27.6
75	SPH	19.0	19.0	19.1	20.6	22.2	25.7	30.4	30.6	29.7	28.7	27.5	26.3
80	SPH	14.9	15.0	15.0	15.8	16.5	21.1	26.5	27.7	27.8	27.8	26.6	25.3
85	SPH	10.9	10.9	10.9	10.9	10.9	16.6	22.6	24.8	25.9	26.9	25.6	24.3
90	SPH	7.6	7.7	7.7	7.0	8.3	12.6	19.1	21.5	23.4	25.3	24.4	23.6
95	SPH	*	*	*	*	*	8.6	14.5	16.5	20.9	23.6	23.3	22.9
100	SPH	*	*	*	*	*	*	11.3	14.3	17.4	20.4	21.1	21.8
105	SPH	*	*	*	*	*	*	7.1	10.5	13.9	17.2	19.0	20.8
110	SPH	*	*	*	*	*	*	*	7.1	11.7	16.4	18.2	19.9
115	SPH	*	*	*	*	*	*	*	*	9.6	15.5	17.3	19.1

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)
*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 4D — Superheat Charging Table, 50HX042

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 1400 CFM											
		Indoor Air — Ewb (F)											
		54	56	58	60	62	64	66	68	70	72	74	76
65	SPH	13.5	13.5	13.5	13.5	17.1	20.7	24.3	25.7	27.1	28.5	27.8	27.0
70	SPH	11.4	11.4	11.4	11.5	15.1	18.7	22.3	23.6	25.1	26.4	26.1	25.8
75	SPH	9.4	9.4	9.4	9.4	13.0	16.5	20.1	21.6	23.0	24.4	24.5	24.6
80	SPH	8.9	8.9	8.9	8.9	12.4	16.0	19.4	21.0	22.4	23.8	24.0	24.0
85	SPH	8.2	8.2	8.2	8.2	11.8	15.3	18.7	20.2	21.8	23.3	23.4	23.4
90	SPH	7.7	7.7	7.7	7.7	10.8	13.7	16.7	18.7	20.7	22.7	22.8	22.9
95	SPH	7.2	7.2	7.2	7.2	9.7	12.2	14.6	17.2	19.7	22.2	22.3	22.3
100	SPH	6.6	6.6	6.6	6.6	9.6	12.6	15.5	17.6	19.7	21.6	21.7	21.7
105	SPH	6.1	6.1	6.1	6.1	9.6	13.1	16.5	18.0	19.5	21.1	21.1	21.2
110	SPH	*	*	*	*	7.0	9.9	13.0	15.0	17.1	19.1	19.8	20.6
115	SPH	*	*	*	*	*	6.9	9.4	11.9	14.5	17.0	18.5	20.0

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)
*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 4E — Superheat Charging Table, 50HX048

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 1600 CFM											
		Indoor Air — Ewb (F)											
		54	56	58	60	62	64	66	68	70	72	74	76
65	SPH	25.8	26.3	27.0	27.6	28.6	29.6	30.5	30.9	31.3	31.7	31.2	30.7
70	SPH	24.2	24.0	23.8	23.6	25.0	26.4	27.8	28.4	29.0	29.7	29.6	29.5
75	SPH	19.7	19.7	19.7	19.7	21.4	23.2	25.0	25.9	26.8	27.6	27.9	28.2
80	SPH	15.8	15.8	15.8	15.8	17.6	19.4	21.2	22.7	24.1	25.6	26.2	26.9
85	SPH	12.0	12.0	12.0	12.0	13.8	15.6	17.5	19.5	21.5	23.5	24.5	25.6
90	SPH	7.5	7.5	7.5	7.5	9.4	11.3	13.2	16.3	19.3	22.4	23.3	24.2
95	SPH	*	*	*	*	5.0	7.0	9.0	13.1	17.1	21.2	22.0	22.8
100	SPH	*	*	*	*	*	*	*	9.4	14.3	19.1	20.3	21.4
105	SPH	*	*	*	*	*	*	*	5.7	11.4	17.1	18.6	20.1
110	SPH	*	*	*	*	*	*	*	*	9.0	13.5	15.8	18.0
115	SPH	*	*	*	*	*	*	*	*	6.7	10.0	13.0	16.0

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)

*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 4F — Superheat Charging Table, 50HX060

TEMP (F) OUTDOOR ENTERING AIR		INDOOR AIR — 1800 CFM											
		Indoor Air — Ewb (F)											
		54	56	58	60	62	64	66	68	70	72	74	76
65	SPH	21.0	21.0	21.0	21.0	22.8	24.7	26.5	27.8	29.1	30.4	29.5	28.6
70	SPH	16.5	16.5	16.5	16.5	18.8	21.1	23.5	25.2	27.0	28.8	28.2	27.6
75	SPH	12.0	12.0	12.0	12.0	14.8	17.6	20.4	22.7	24.9	27.2	26.9	26.6
80	SPH	10.5	10.5	10.5	10.5	12.7	14.9	17.1	19.8	22.5	25.2	25.4	25.5
85	SPH	9.0	9.0	9.0	9.0	10.6	12.3	13.9	17.0	20.0	23.1	23.8	24.5
90	SPH	4.5	4.5	4.5	4.5	6.5	8.5	10.5	14.3	18.1	21.9	22.7	23.5
95	SPH	*	*	*	*	*	4.8	7.2	11.7	16.2	20.7	21.6	22.5
100	SPH	*	*	*	*	*	*	3.6	8.6	13.6	18.6	20.0	21.4
105	SPH	*	*	*	*	*	*	*	5.5	11.1	16.6	18.5	20.4
110	SPH	*	*	*	*	*	*	*	*	10.0	15.5	17.5	19.4
115	SPH	*	*	*	*	*	*	*	*	9.2	14.7	16.5	18.5

LEGEND

Ewb — Entering Wet Bulb
SPH — Superheat at Compressor (F)

*Do not attempt to charge system under these conditions — refrigerant slugging may occur.

Table 5 — Required Suction-Tube Temperature (F)*

SUPERHEAT TEMP (F)	SUCTION PRESSURE AT SERVICE PORT (psig)								
	61.5	64.2	67.1	70.0	73.0	76.0	79.2	82.4	85.7
0	35	37	39	41	43	45	47	49	51
2	37	39	41	43	45	47	49	51	53
4	39	41	43	45	47	49	51	53	55
6	41	43	45	47	49	51	53	55	57
8	43	45	47	49	51	53	55	57	59
10	45	47	49	51	53	55	57	59	61
12	47	49	51	53	55	57	59	61	63
14	49	51	53	55	57	59	61	63	65
16	51	53	55	57	59	61	63	65	67
18	53	55	57	59	61	63	65	67	69
20	55	57	59	61	63	65	67	69	71
22	57	59	61	63	65	67	69	71	73
24	59	61	63	65	67	69	71	73	75
26	61	63	65	67	69	71	73	75	77
28	63	65	67	69	71	73	75	77	79
30	65	67	69	71	73	75	77	79	81
32	67	69	71	73	75	77	79	81	83
34	69	71	73	75	77	79	81	83	85
36	71	73	75	77	79	81	83	85	87
38	73	75	77	79	81	83	85	87	89
40	75	77	79	81	83	85	87	89	91

*Temperature at suction service valve.

INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

⚠ CAUTION

For cooling operation, the recommended airflow is 350 to 450 cfm per each 12,000 Btuh of rated cooling capacity.

Table 6 shows airflows at several external static pressures. Table 7 shows air delivery for ICM units. Tables 8 - 10 show accompanying pressure drops for wet coils, electric heaters, and filters. Be sure that airflow does not fall below requirement for safe electric heater operation. See Table 2. Refer to these tables to determine the airflow for the system being installed.

NOTE: Be sure that all supply- and return-air grilles are open, free from obstructions, and adjusted properly.

⚠ WARNING

Disconnect electrical power to the unit before changing blower speed. Electrical shock can cause personal injury or death.

For 208/230-v and A.O. Smith 460-v Blower Motors (Non-ICM) — The airflow can be changed by changing the lead connections of the blower motor. The motor leads are color-coded as follows:

3-SPEED

black = high speed
blue = medium speed
red = low speed

NOTE: Three-speed, indoor-fan motors are factory wired for low-speed operation (red wire) on all models, except sizes 030 and 042. Sizes 030 and 042 are factory wired for medium speed (blue wire).

To change the speed of the blower motor, remove the fan motor speed leg lead from the indoor-fan contactor (IFC). This wire is attached to terminal 4 for single-phase units and terminal 3 for 3-phase units. To change the speed, remove red (blue on sizes 030 and 042) wire and replace with lead for desired blower motor speed. *Make sure that the removed lead is insulated so that it will not contact any unit chassis parts.*

For 460-v GE motors (Non-ICM) — The motor leads are color coded as follows:

3-SPEED

black = high
blue = jumper
orange = medium
red = low

NOTE: Three-speed, indoor-fan motors are factory wired for low-speed operation. Size 042 is factory wired for medium speed.

To change the speed of the blower motor, remove red fan motor speed lead from the indoor-fan contactor (IFC). This wire is attached to terminal 3. Insulate lead end to avoid contact with chassis. Replace wire with lead for desired blower motor speed. To select high-speed, disconnect blue and black leads from each other. Connect black lead to IFC terminal 3. Leave blue lead disconnected.

For Integrated Control Motors (ICM) — To configure the 50HX unit, move the 5 Easy Select board wires to the terminals which control the airflow. Refer to the Easy Select interface board (Fig. 32) located next to the terminal and to Fig. 31.

Perform the following steps for basic system configuration.

AUX HEAT RANGE (VIO)

NOTE: If no heater is installed, this step can be omitted.

The airflow for electric heat is selected with the AUX HEAT RANGE terminals. Refer to Table 2 and the installation instructions for electric heaters for minimum airflow required for safe heater operation. Refer to table below for the available airflows. Each easy select pin is configured for a certain airflow. The airflow will be supplied in the Heating mode on heat pumps when electric heat is energized. The preset factory default selection is the highest airflow.

TERMINAL	1	2	3	4
Available Airflow (Cfm)	1365	1470	1680	1840

AC/HP SIZE (BLU) — The preset factory default selection for AC/HP SIZE (air conditioner/heat pump) is set to terminal 3 for size 048 and terminal 4 for size 060.

See table below for various airflows supplied at terminals:

TERMINAL	1	2	3	4
	Available Airflow (Cfm)			
048,060 — Cooling Mode 048 Heating Mode	1260	1440	1575	1800
060 — Heating Mode	1400	1600	1750	2000

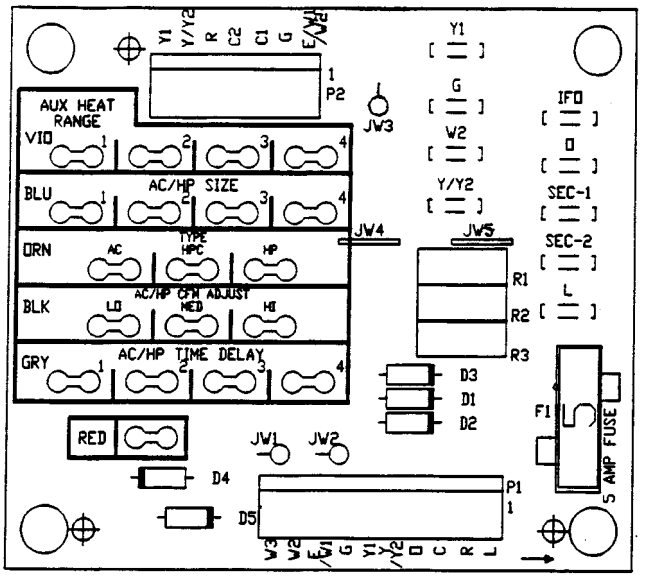
TYPE (ORN) — The TYPE is a preset factory default selection. The preset factory default setting is HPC for size 048 and HP for size 060. Default setting should not be altered.

AC/HP CFM ADJUST (BLK) — The preset factory default selection is MED. Selections HI and LO will adjust the airflow supplied for all operational modes (see table below). The selection options allow installer to adjust airflow to meet such individual needs as noise and static compensation, etc.

MODE	FAN ONLY	COOLING	HEATING
LO - Adjust	−15%	−10%	−10%
HI - Adjust	15%	10%	10%

AC/HP TIME DELAY (GRY) — Four motor operation delay options are provided to customize system operation. See listing below:

OPTION	DESCRIPTION
30-Sec On/60-Sec Off Delay Profile (Terminal 1)	Used when it is desirable to allow system coils time to heat up or cool down prior to airflow.
No Delay Option (Terminal 2)	Used for servicing or when other components are used to perform the delay function.
30-Sec Off Delay (Terminal 3)	Preset factory default setting for 50HX units.
45-Sec Off Delay (Terminal 4)	Enhances system efficiency.



LEGEND

IFO — Indoor Fan On
JW — Jumper Wire

Fig. 32 — Easy Select Interface Board

UNIT CONTROLS — All compressors have the following internal-protection controls.

High-Pressure Relief Valve — This valve opens when the pressure differential between the low and high side becomes excessive.

Compressor Overload — This overload interrupts power to the compressor when either the current or internal temperature become excessive, and automatically resets when the internal temperature drops to a safe level.

This overload may require up to 60 minutes (or longer) to reset; therefore, if the internal overload is suspected of being open, disconnect the electrical power to the unit and check the circuit through the overload with an ohmmeter or continuity tester.

SEQUENCE OF OPERATION — NON-ICM UNITS — When power is supplied to unit, the transformer (TRAN) is energized.

Cooling — With the thermostat subbase in the cooling position, and when the space temperature comes within 2° F of the cooling set point, the thermostat makes circuit R-O. This energizes the reversing valve solenoid (RVS) and places the unit in standby condition for cooling.

As the space temperature continues to rise, the second stage of the thermostat makes, closing circuit R-Y. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to contactor (C), starting the compressor (COMP) and outdoor-fan motor (OFM). Circuit R-G is made at the same time, energizing the indoor-fan relay (IFR) and starting the indoor-fan motor (IFM) after 1-second delay.

When the thermostat is satisfied, contacts open, deenergizing C. The COMP and OFM stop, and the IFM may be controlled by a time-delay relay that keeps the fan on for 30 seconds for 50HX030-042 units, or 80 seconds for the 50HX024 unit.

See Fig. 33 for typical operation of heat pumps in cooling mode.

Heating — On a call for heat, thermostat makes circuits R-Y and R-G. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to C, starting COMP and OFM. Circuit R-G also energizes IFR and starts IFM after 1-second delay.

Should room temperature continue to fall, circuit R-W is made through second-stage thermostat bulb. If optional electric heat package is used, a relay is energized, bringing on first bank of supplemental electric heat. When thermostat is satisfied, contacts open, deenergizing contactor and relay; motors and heaters deenergize. The IFM may be controlled by a time-delay relay that keeps the fan on for 30 seconds for 50HX030-042 units, or 80 seconds for 50HX024 unit.

See Fig. 34 for typical operation of heat pumps in heating mode.

Defrost — Defrost board (DB) is a time and temperature control, which includes a field-selectable time period between checks for defrost (30, 50, and 90 minutes). Electronic timer and defrost cycle start only when contactor is energized and defrost thermostat (DFT) is closed.

Defrost mode is identical to Cooling mode, except outdoor-fan motor stops and a bank of optional electric heat turns on to warm air supplying the conditioned space.

SEQUENCE OF OPERATION — ICM UNITS — When power is supplied to unit, the transformer (TRAN) is energized.

Cooling — With the thermostat subbase in the cooling position, and when the space temperature comes within 2° F of the cooling set point, the thermostat makes circuit R-O. This energizes the reversing valve solenoid (RVS) and places the unit in standby condition for cooling.

As the space temperature continues to rise, the second stage of the thermostat makes, closing circuit R-Y. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to contactor (C), starting the compressor (COMP) and outdoor-fan motor (OFM). Circuit R-G is made at the same time, energizing the indoor-fan motor (IFM).

When the thermostat is satisfied, contacts open, deenergizing C. The COMP and OFM stop, and the IFM stops after a short time delay.

See Fig. 33 for typical operation of heat pumps in cooling mode.

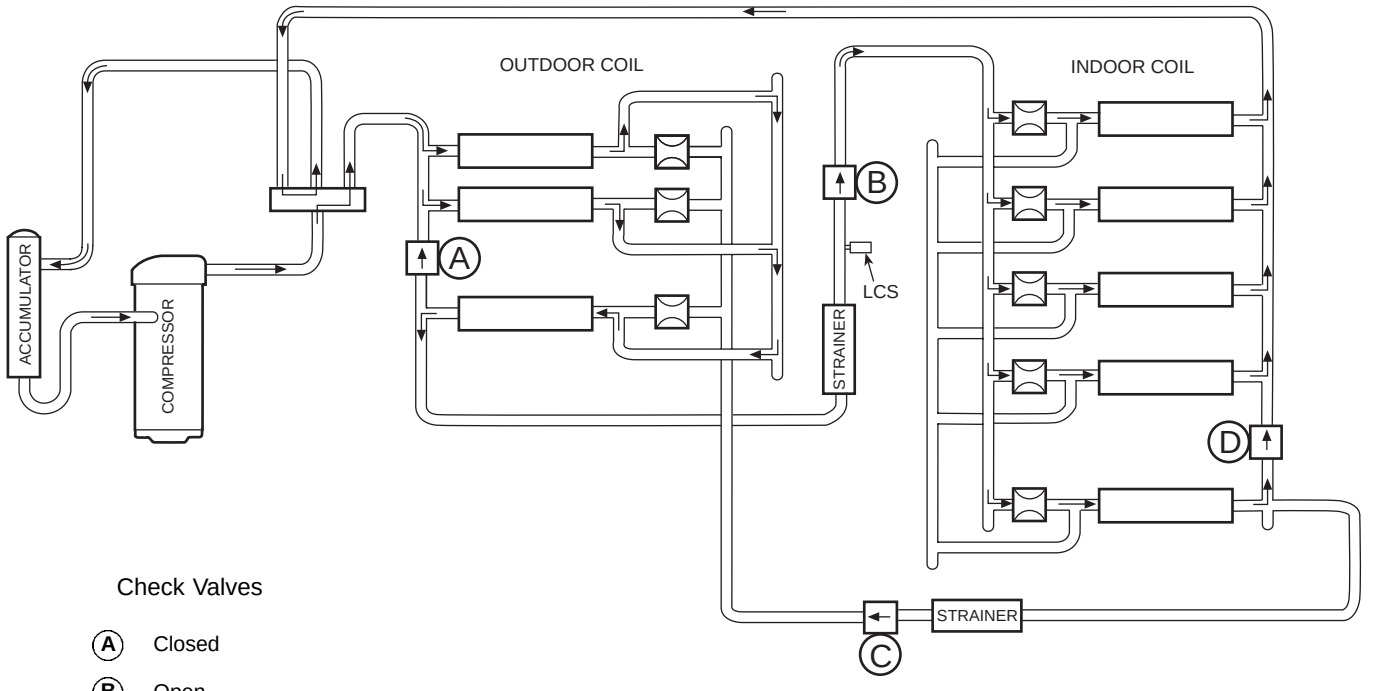
Heating — On a call for heat, thermostat makes circuits R-Y and R-G. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to C, starting COMP and OFM. Circuit R-G also starts the IFM.

Should room temperature continue to fall, circuit R-W is made through second-stage thermostat bulb. If optional electric heat package is used, a relay is energized, bringing on first bank of supplemental electric heat. At this time, the airflow (cfm) will be either the AUX HEAT RANGE (VIO) setting or the AC/HP SIZE (BLU) setting, whichever is greater. This may be a noticeable change in airflow. When thermostat is satisfied, contacts open, deenergizing contactor and relay; motors and heaters deenergize. The IFM has a time-delay relay that keeps the fan on for 30 seconds.

See Fig. 34 for typical operation of heat pumps in heating mode.

Defrost — Defrost board (DB) is a time and temperature control, which includes a field-selectable time period between checks for defrost (30, 50, and 90 minutes). Electronic timer and defrost cycle start only when contactor is energized and defrost thermostat (DFT) is closed.

Defrost mode is identical to Cooling mode, except outdoor-fan motor stops and a bank of optional electric heat turns on to warm air supplying the conditioned space.



Check Valves

(A) Closed

(B) Open

(C) Closed

(D) Open

LEGEND

LCS — Loss of Charge Switch

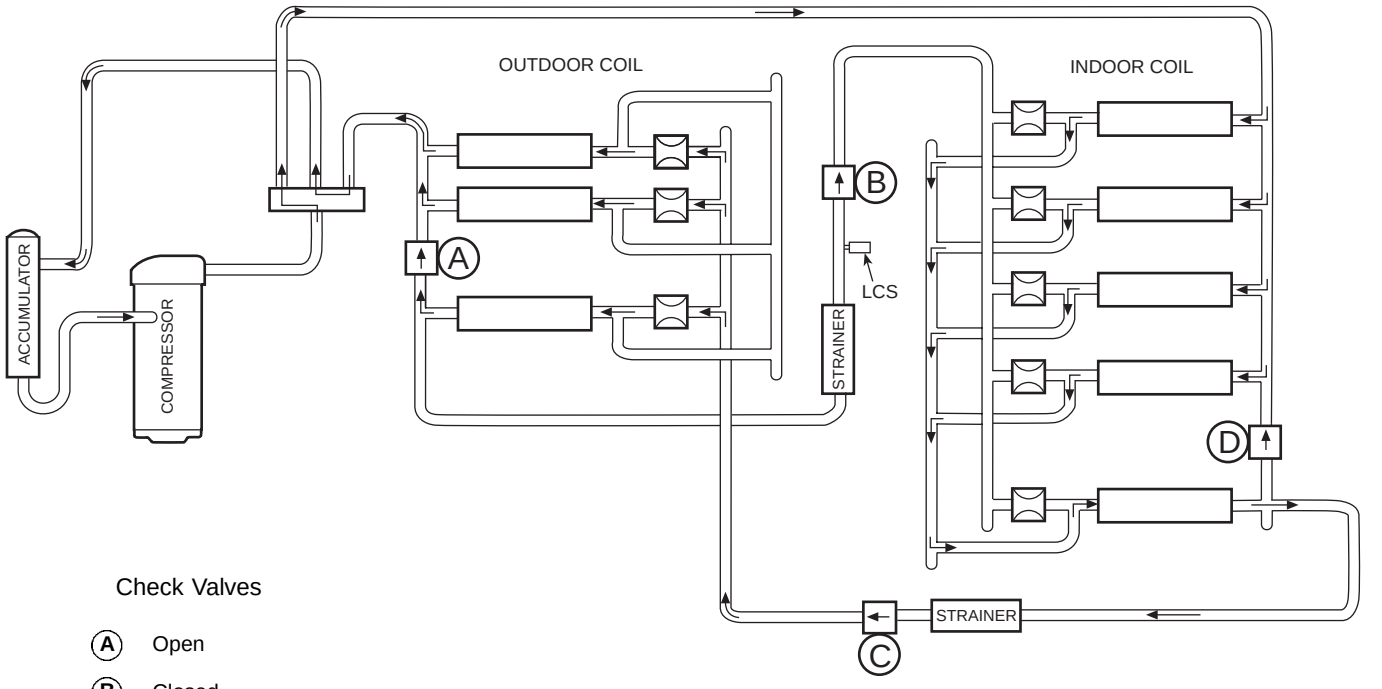
Acutrol™ Metering Device

Check Valve (Arrow indicates direction of flow)

COOLING CYCLE

1. Hot gas from compressor flows through the 4-way valve and is directed to the heating liquid line check valve. It is then condensed and subcooled through converging circuits. Refrigerant leaves the outdoor coil by way of the strainer and the check valve in the cooling liquid line.
2. The refrigerant then feeds the indoor coil through the Acutrol metering device on each circuit.
3. Each circuit evaporates the refrigerant and the circuits are combined in the indoor coil header with some of the circuits flowing through the check valve.
4. The refrigerant then flows through the 4-way valve, accumulator, and back to the compressor.

Fig. 33 — Typical Heat Pump Operation, Cooling Mode



Check Valves

(A) Open

(B) Closed

(C) Open

(D) Closed

LEGEND

LCS — Loss of Charge Switch

Acutrol™ Metering Device

Check Valve (Arrow indicates direction of flow)

HEATING CYCLE

1. Hot gas from compressor flows through the 4-way valve and is directed to the cooling liquid line check valve. It is then condensed and directed through subcooling circuits and out to the strainer and the check valve in the heating liquid line.
2. The refrigerant then feeds the outdoor coil through the Acutrol metering device on each circuit.
3. Each circuit evaporates the refrigerant and the circuits are combined in the outdoor header with some of the circuits flowing through the check valve.
4. The refrigerant then flows through the 4-way valve, accumulator, and back to the compressor.

Fig. 34 — Typical Heat Pump Operation, Heating Mode

Table 6 — Dry Coil Air Delivery* — Horizontal and Vertical Discharge (Deduct 10% for 208 V) — Units 024-042

UNIT 50HX	MOTOR SPEED		230 AND 460 V HORIZONTAL DISCHARGE										
			External Static Pressure (in. wg)										
			0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
024	Low	Watts	280	275	265	255	250	245	240	—	—	—	—
		Cfm	820	810	755	700	660	600	560	—	—	—	—
	Med	Watts	365	360	350	345	340	330	320	310	300	—	—
		Cfm	1025	1010	975	940	900	850	800	720	630	—	—
	High	Watts	—	—	490	480	470	460	445	430	410	390	380
		Cfm	—	—	1300	1255	1200	1150	1080	1005	915	790	620
030	Low	Watts	—	—	—	—	—	—	—	—	—	—	—
		Cfm	—	—	—	—	—	—	—	—	—	—	—
	Med	Watts	—	365	360	360	350	350	—	—	—	—	—
		Cfm	—	1060	1020	980	935	880	—	—	—	—	—
	High	Watts	—	—	—	—	490	485	475	460	450	430	—
		Cfm	—	—	—	—	1270	1220	1170	1100	1020	920	—
036	Low	Watts	410	400	390	380	370	360	—	—	—	—	—
		Cfm	1275	1240	1195	1150	1095	1040	—	—	—	—	—
	Med	Watts	550	535	520	505	485	470	455	435	415	—	—
		Cfm	1575	1520	1470	1410	1345	1280	1210	1125	1025	—	—
	High	Watts	—	—	—	—	680	655	625	595	570	530	485
		Cfm	—	—	—	—	1720	1625	1530	1430	1320	1190	995
042	Low	Watts	490	480	470	460	450	430	410	390	—	—	—
		Cfm	1400	1380	1340	1300	1250	1200	1140	1070	—	—	—
	Med	Watts	590	580	560	545	525	505	480	450	420	—	—
		Cfm	1600	1560	1540	1470	1430	1360	1300	1220	1120	—	—
	High	Watts	—	—	—	—	—	700	670	640	600	560	500
		Cfm	—	—	—	—	—	1780	1670	1600	1480	1340	1100

*Air delivery values are based on operating voltage of 230 v or 460 v, dry coil, without filter or electric heater. Deduct wet coil, filter, and electric heater pressure drops to obtain external static pressure available for ducting.

NOTES:
1. Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Indoor coil frosting may occur at airflows below this point.
2. Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended.

Table 7 — Dry-Coil Air Delivery* — Horizontal and Vertical Discharge for Integrated Control Motor Units at 230 V (Deduct 10% from Cfm for 208-V Operation) — Units 048 and 060

UNIT 50HX	FAN ONLY (Cfm)	COOLING (Cfm)	HEATING (Cfm)
048	1530	1575	1575
060	1750	1800	2000

*Air delivery values are for dry coil at 230 v. Airflow is independent of external static pressure within ±5% of table values up to 0.8 in. wg. Air delivery is preset at factory. For airflow adjustments, see Indoor Airflow and Airflow Adjustments, For Integrated Control Motors section on page 25.

NOTE: Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity. Indoor coil icing may occur at airflows below this point. Water blow-off may occur at airflows above 450 cfm per 12,000 Btuh of rated cooling capacity.

Table 8 — Wet Coil Pressure Drop

UNIT SIZE 50HX	AIRFLOW (cfm)	PRESSURE DROP (in. wg)
024	600	0.012
	700	0.022
	800	0.027
	900	0.039
030	900	0.039
	1000	0.057
	1200	0.072
036	1000	0.051
	1200	0.061
	1400	0.068
	1600	0.075
042	1000	0.030
	1200	0.048
	1400	0.057
	1600	0.078
048	1400	0.068
	1600	0.075
	1800	0.088
060	1700	0.082
	1900	0.095
	2100	0.108
	2300	0.123

Table 9 — Accessory Electric Heater Pressure Drop (in. wg)

HEATER kW	CFM								
	600	800	1000	1200	1400	1600	1800	2000	2200
5-20	0.030	0.033	0.037	0.042	0.047	0.052	0.060	0.067	0.075

Table 10 — Filter Pressure Drop (in. wg)

UNIT SIZE 50HX	FILTER SIZE (in.)	CFM																		
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
024,030	24 x 24	—	—	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.12	0.13	—	—	—	—	—	—	—	—
036-060	24 x 30	—	—	—	—	—	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.17	0.18

MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This heat pump unit should be inspected at least once each year by a qualified service person. To troubleshoot units, refer to Cooling and Heating Troubleshooting Chart in back of book.

NOTE TO EQUIPMENT OWNER: Consult your local dealer about the availability of a maintenance contract.

⚠ WARNING

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment, other than those procedures recommended in the User's Manual. FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND POSSIBLE DAMAGE TO THIS EQUIPMENT.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filter(s) each month. Clean or replace when necessary.
2. Inspect indoor coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect blower motor and wheel for cleanliness and check lubrication each cooling season. Clean and lubricate (if required) when necessary.
4. Check electrical connections for tightness and controls for proper operation each cooling season. Service when necessary.

⚠ WARNING

Failure to follow these warnings could result in serious personal injury:

1. Turn off electrical power to the unit before performing any maintenance or service on the unit.
2. Use extreme caution when removing panels and parts. As with any mechanical equipment, personal injury can result from sharp edges.
3. Never place anything combustible either on, or in contact with, the unit.

Air Filter

⚠ CAUTION

Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Table 1 for recommended filter sizes.

Inspect air filter(s) at least once each month and replace (throwaway-type) or clean (cleanable-type) at least twice during each cooling season or whenever the filters become clogged with dust and lint.

Replace filters with the same dimensional size and type as originally provided, when necessary.

Unit Top Removal

NOTE: When performing maintenance or service procedures that require removal of the unit top, be sure to perform *all* of the routine maintenance procedures that require top removal, including coil inspection and cleaning, and condensate drain pan inspection and cleaning.

Only qualified service personnel should perform maintenance and service procedures that require unit top removal. Refer to the following top removal procedures:

1. Remove 7 screws on unit top cover surface. (Save all screws.)
2. Remove 4 screws on unit top cover flange. (Save all screws.)
3. Lift top from unit carefully. Set top on edge and make sure that top is supported by unit side that is opposite duct (or plenum) side.
4. Carefully replace and secure unit top to unit, using screws removed in Steps 1 and 2, when maintenance and/or service procedures are completed.

Indoor Blower and Motor

NOTE: Motors without oilers are prelubricated. Do not attempt to lubricate these motors.

For longer life, operating economy, and continuing efficiency, clean accumulated dirt and grease from the blower wheel and motor annually.

Lubricate the motor every 5 years if the motor is used intermittently (thermostat FAN switch in AUTO. position), or every 2 years if the motor is used continuously (thermostat FAN switch in ON position).

⚠ WARNING

Disconnect and tag electrical power to the unit before cleaning and lubricating the blower motor and wheel. Failure to adhere to this warning could cause personal injury or death.

To clean and lubricate the blower motor and wheel:

1. Remove and disassemble blower assembly as follows:
   a. Remove blower access door.
   b. Disconnect motor lead from indoor-fan contactor (IFC). Disconnect yellow motor lead from terminal L2 or 23 of the contactor.
   c. Remove blower assembly from unit. Be careful not to tear insulation in blower compartment.
   d. Ensure proper reassembly by marking blower wheel and motor in relation to blower housing before disassembly.
   e. Loosen setscrew(s) which secure wheel to motor shaft. Remove screws that secure motor mount brackets to housing and slide motor and motor mount out of housing.
2. Lubricate motor as follows:
   a. Thoroughly clean all accumulations of dirt or grease from motor housing.
   b. Remove dust caps or plugs from oil ports located at each end of motor.
   c. Use a good grade of SAE (Society of Automotive Engineers) 20 nondetergent motor oil and put one teaspoon (3⁄16 oz. or 16 to 25 drops) in each oil port.
   d. Allow time for oil to be absorbed by each bearing, then wipe excess oil from motor housing.
   e. Replace dust caps or plugs in oil ports.
3. Remove and clean blower wheel as follows:
   a. Ensure proper reassembly by marking wheel orientation and cutoff plate location.
   b. Remove screws holding cut-off plate, and remove plate from housing.
   c. Lift wheel from housing. When handling and/or cleaning blower wheel, be sure not to disturb balance weights (clips) on blower wheel vanes.

d. Remove caked-on dirt from wheel and housing with a brush. Remove lint and/or dirt accumulations from wheel and housing with vacuum cleaner, using soft brush attachment. Remove grease and oil with mild solvent.

e. Reassemble wheel and cut-off plate into housing.

f. Reassemble motor into housing. Be sure setscrews are tightened on motor-shaft flats and not on round part of shaft.

Outdoor Coil, Indoor Coil, and Condensate Drain Pan — Inspect the outdoor coil, indoor coil, and condensate drain pan at least once each year. Proper inspection and cleaning requires the removal of the unit top. See Unit Top Removal section on page 31.

The coils are easily cleaned when dry; therefore, inspect and clean the coils either before or after each cooling season. Remove all obstructions (including weeds and shrubs) that interfere with the airflow through the outdoor coil. Straighten bent fins with a fin comb. If coated with dirt or lint, clean the coils with a vacuum cleaner, using a soft brush attachment. Be careful not to bend the fins. If coated with oil or grease, clean the coils with a mild detergent-and-water solution. Rinse coils with clear water, using a garden hose. Be careful not to splash water on motors, insulation, wiring, or air filter(s). For best results, spray outdoor coil fins from inside to outside the unit. On units with an outer and inner outdoor coil, be sure to clean between the coils. Be sure to flush all dirt and debris from the unit base.

Inspect the drain pan and condensate drain line when inspecting the coils. Clean the drain pan and condensate drain by removing all foreign matter from the pan. Flush the pan and drain tube with clear water. Do not splash water on the insulation, motor, wiring, or air filter(s). If the drain tube is restricted, clear it with a ''plumbers snake'' or similar probe device. Ensure that the auxiliary drain port above the drain tube is also clear.

Outdoor Fan

⚠ CAUTION

Keep the condenser fan free from all obstructions to ensure proper cooling operation. Never place articles on top of the unit. Damage to unit may result.

1. Remove screws at bottom of outdoor air intake grille and remove plastic grille.
2. Inspect the fan blades for cracks or bends.
3. If fan needs to be removed, loosen the setscrew and slide the fan off the motor shaft.
4. When replacing fan blade, position blade so that leading edge is 2 in. back from outdoor inlet grille or ½ in. maximum from fan deck. See Fig. 35.
5. Ensure that setscrew engages the flat area on the motor shaft when tightening.

Electrical Controls and Wiring — Inspect and check the electrical controls and wiring annually. *Be sure to turn off the electrical power to the unit.*

Remove the control/blower and compressor compartment access panels to locate all the electrical controls and wiring. Check all electrical connections for tightness. Tighten all screw connections. If any smoky or burned connections are noticed, disassemble the connection, clean all the parts, restrip the wire end and reassemble the connection properly and securely.

After inspecting the electrical controls and wiring, replace all the panels. Start the unit, and observe at least one complete cooling cycle to ensure proper operation. If discrepancies are observed in operating cycle, or if a suspected malfunction has occurred, check each electrical component with the proper electrical instrumentation. Refer to the unit wiring label when making these checkouts.

NOTE: Refer to the Sequence of Operation sections on pages 25 and 26 as an aid in determining proper control operation.

Refrigerant Circuit — Inspect all refrigerant tubing connections and the unit base for oil accumulations annually. Detecting oil generally indicates a refrigerant leak.

If oil is detected or if low performance is suspected, leak-test all refrigerant tubing using an electronic leak-detector, or liquid-soap solution. If a refrigerant leak is detected, refer to Check for Refrigerant Leaks section on page 20.

If no refrigerant leaks are found and low performance is suspected, refer to Checking and Adjusting Refrigerant Charge section on page 21.

Indoor Airflow — The indoor airflow does not require checking unless improper performance is suspected. *If a problem exists, be sure that all supply- and return-air grilles are open and free from obstructions, and that the air filter is clean.* When necessary, refer to Indoor Airflow and Airflow Adjustments section on page 24 to check the system airflow.

Metering Devices — Refrigerant metering devices are fixed orifices and are located in the inlet header to the indoor and outdoor coils.

Liquid Line Strainers — The liquid line strainers (to protect metering device) are made of wire mesh and are located in the liquid lines on the inlet side of the metering devices.

Check valves are also located in the liquid lines near the strainers. The strainers are the larger of the two components.

LIQUID LINE SOLENOID VALVE (50HX024 Only) — A liquid line solenoid valve is installed in the cooling liquid line. The valve is normally closed and energized open when compressor contactor is closed. This operation, combined with the indoor-fan off delay, provides additional cooling with less power consumption.

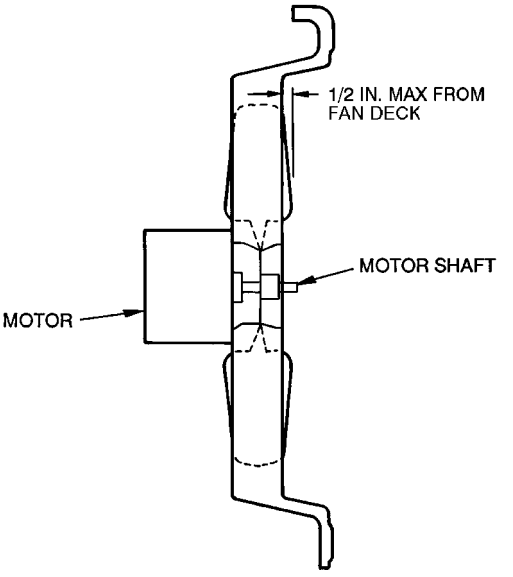


Fig. 35 — Fan Blade Clearance

COOLING AND HEATING TROUBLESHOOTING CHART

SYMPTOM	CAUSE	REMEDY
Compressor and outdoor fan will not start.	Power failure	Call power company.
	Fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, control relay, or defrost board	Replace component.
	Insufficient line voltage	Determine cause and correct.
	Incorrect or faulty wiring	Check wiring diagram and rewire correctly.
	Thermostat setting too high	Lower thermostat setting below room temperature.
	Units have a 5-minute time delay	DO NOT bypass this compressor time delay — wait for 5 minutes until time-delay relay is deenergized.
Compressor will not start but outdoor fan runs.	Faulty wiring or loose connections in compressor circuit	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open	Determine cause. Replace compressor.
	Defective run capacitor, overload, or PTC (positive temperature coefficient) thermistor	Determine cause and replace.
	One leg of 3-phase power dead	Replace fuse or reset circuit breaker. Determine cause.
	Low input voltage (20% low)	Determine cause and correct.
Three-phase scroll compressor (size 030-060 units) makes excessive noise, and there may be a low pressure differential	Scroll compressor is rotating in the wrong direction	Correct the direction of rotation by reversing the 3-phase power leads to the unit.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge	Recover refrigerant, evacuate system, and recharge to capacities shown on nameplate.
	Defective compressor	Replace and determine cause.
	Insufficient line voltage	Determine cause and correct.
	Blocked outdoor coil	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay	Determine cause and replace.
	Defective thermostat	Replace thermostat.
	Faulty outdoor-fan motor or capacitor	Replace.
	Damaged reversing valve	Determine cause and correct.
	Faulty or disconnected liquid line solenoid valve or coil (50HX024)	Determine cause and correct.
	Restriction in refrigerant system	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter	Replace filter.
	Unit undersized for load	Decrease load or increase unit size.
	Thermostat set too low	Reset thermostat.
	Low refrigerant charge	Locate leak, repair, and recharge.
	Leaking valves in compressor	Replace compressor.
	Frosted coil with incorrect defrost operation	Check defrost time settings. Reset as necessary. Check defrost temperature switch. Replace as necessary.
	Air in system	Recover refrigerant, evacuate system, and recharge.
	Outdoor coil dirty or restricted	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter	Replace filter.
	Dirty indoor or outdoor coil	Clean coil.
	Refrigerant overcharged	Recover excess refrigerant.
	Air in system	Recover refrigerant, evacuate system, and recharge.
	(Heat) Indoor air restricted or recirculating	Determine cause and correct.
	Faulty or disconnected liquid line solenoid valve or coil (50HX024)	Determine cause and correct.
	Indoor or outdoor air restricted or air short-cycling	Determine cause and correct.
Head pressure too low.	Low refrigerant charge	Check for leaks, repair and recharge.
	Compressor valves leaking	Replace compressor.
	Restriction in liquid tube	Remove restriction.

COOLING AND HEATING TROUBLESHOOTING CHART (cont)

SYMPTOM	CAUSE	REMEDY
Excessive suction pressure.	(Heat) Outdoor coil frosted	Move timer on control board to 30 minutes between defrost cycles.
	(Cool) High heat load	Check for source and eliminate.
	Compressor valves leaking	Replace compressor.
	Reversing valve hung up or leaking internally	Replace valve.
	Refrigerant overcharged	Reclaim excess refrigerant.
	Faulty or disconnected liquid line solenoid valve or coil (50HX024)	Determine cause and correct.
Suction pressure too low.	(Cool) Dirty air filter	Replace filter.
	(Heat) Outdoor coil frosted	Move timer on control board to 30 minutes between defrost cycles.
	Low refrigerant charge	Check for leaks, repair and recharge.
	Metering device or low side restricted	Remove source of restriction.
	(Cool) Insufficient coil airflow	Increase air quantity. Check filter — replace if necessary.
	(Cool) Temperature too low in conditioned area	Reset thermostat.
	(Cool) Outdoor ambient below 40 F	Install low-ambient kit.
	Field-installed filter-drier restricted	Replace.
	Faulty or disconnected liquid line solenoid valve or coil (50HX024)	Determine cause and correct.
Compressor runs but outdoor fan does not.	NC (normally closed) contacts on defrost board open	Check condition of relay on board. Replace if necessary.
Integrated control motor (sizes 048 and 060) IFM does not run.	Blower wheel not secured to shaft	Properly tighten blower wheel to shaft.
	Insufficient voltage at motor	Determine cause and correct.
	Power connectors not properly seated	Connectors should snap easily; do not force.
Integrated control motor (sizes 048 and 060) IFM runs when it should be off.	Motor programmed with a delay profile	Allow a few minutes for motor to shut off.
	With thermostat in off state, the voltage on G,Y1,Y,Y2,W with respect to common, should be ½ of actual low voltage supply	If measured voltage is more than ½, the thermostat is incompatible with motor. If voltage is less than ½, the motor has failed.
Integrated control motor (sizes 048 and 060) IFM operation is intermittent.	Water dripping into motor	Verify proper drip loops in connector wires.
	Connectors not firmly seated	Gently pull wires individually to be sure they are crimped into the housing.

IFM — Indoor Fan Motor

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START-UP CHECKLIST
(Remove and Store in Job File)

I. PRELIMINARY INFORMATION

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT

☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS

☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS

☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS

☐ CHECK THAT INDOOR-AIR FILTER IS CLEAN AND IN PLACE

☐ VERIFY THAT UNIT INSTALLATION IS LEVEL

☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2,L3 _____ L3-L1 _____

COMPRESSOR AMPS L1 _____ L2 _____ L3 _____

INDOOR-FAN AMPS _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ DB (dry bulb)

RETURN-AIR TEMPERATURE _____ DB _____ WB (wet bulb)

HEAT PUMP SUPPLY AIR _____

ELECTRIC HEATER SUPPLY AIR _____

PRESSURES

REFRIGERANT SUCTION _____ PSIG

REFRIGERANT DISCHARGE _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES ON PAGES 21-23.

☐ VERIFY 3-PHASE SCROLL COMPRESSOR IS ROTATING IN CORRECT DIRECTION.

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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